

## Oscillatory Motion

## Worksheet

1

## 1. Complete the following statements :

1. .... and .... are examples of periodic motion.
2. The oscillatory motion is the motion of the oscillating body around its ..... point and its velocity is ..... when it passes this point.
3. .... and .... are examples of the oscillatory motion.
4. The ..... motion is considered as the simplest form of the oscillatory motion.
5. The kinetic energy =  $\frac{1}{2}$  .....  $\times$  .....

## 2. Give reasons for :

1. The motion of a clock pendulum is considered as a periodic motion.  
.....
2. The oscillation of the tuning fork is an oscillatory motion.  
.....  
.....

## 3. Define :

1. Periodic motion.

(Al-Mostakbal Modern Sch. / Giza 2019)

2. Oscillatory motion.

(El-Agamy Zone / Alex. 2019)

## 4. What happens when ... ?

The oscillating body passes its rest position during its movement. (Concerning its velocity)

(El-Sayeda Khadija Official Lang. Sch. / Cairo 2022)

## Worksheet

2

## 1. A. Choose the correct answer :

1. The ..... includes four successive maximum displacements.  
a. amplitude   b. complete oscillation   c. wavelength   d. half complete oscillation



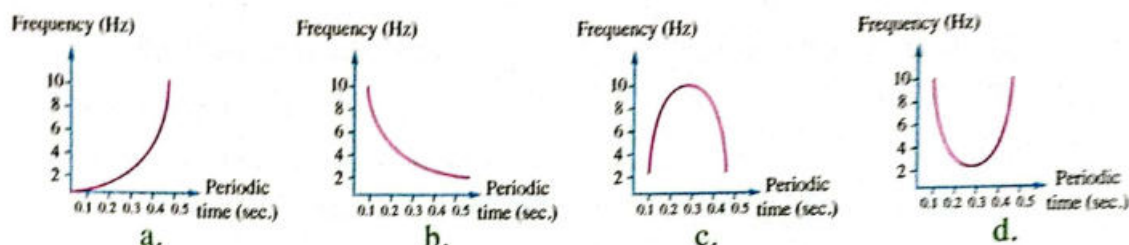
2. If the frequency of an oscillating body is 100 Hz, so the periodic time is ..... seconds.

(Belkas zone / Dakahlia 2019)

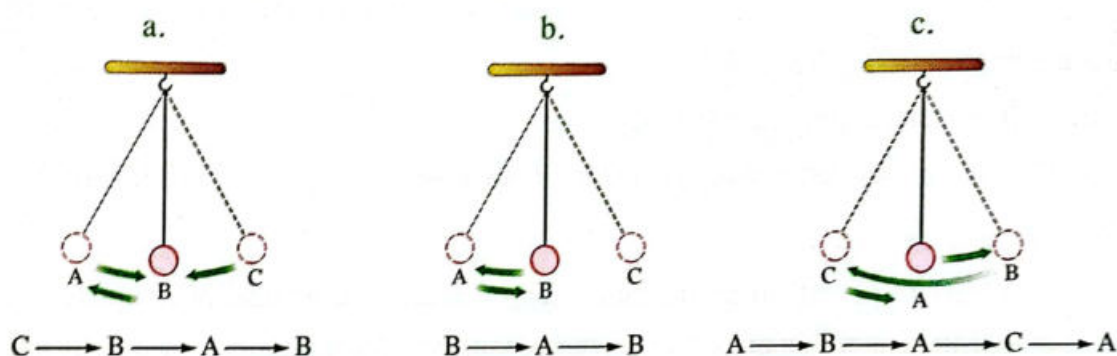
- a. 100      b. 0.01      c. 0.1      d.  $1 \times 10^2$

3. Which figure represents the relation between the periodic time and the frequency ? .....

(El-Behaira 2023)



4. Which figure represents a half complete oscillation ? .....



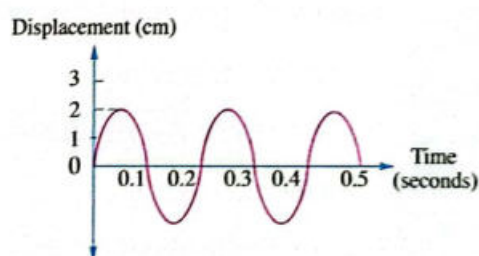
5. The time taken by the vibrating body to make one complete oscillation is .....

- a. amplitude.      b. frequency.      c. periodic time.      d. complete oscillation.

**B. From the opposite figure of the oscillatory motion of a simple pendulum, calculate :**

- Amplitude.
- Periodic time.
- Frequency.

.....  
 .....  
 .....



**2. A. Put (✓) or (✗) :**

- Complete oscillation is the maximum displacement done by the oscillating body away from its rest position. ( )
- The periodic time is the time taken by an oscillating body to make 4 successive maximum displacements away from its rest position. ( )
- The oscillating body which its frequency is 50 Hz, it takes 50 sec. to make one complete oscillation. ( )



**B. What's meant by ...?**

1. The amplitude of an oscillating body is 0.2 metre.

(El-Gomrok zone / Alex. 2019)

2. The frequency of a tuning fork is 652 Hz.

3. The time taken by the oscillating body to make 30 complete oscillations is 10 seconds.

(Minia Ksawmia sch. / El-Minia 2019)

4. The oscillating body makes 540 oscillations in one and a half minute.

(Patriarchal College / Cairo 2019)

**3. A. Write the scientific term :**

1. The reciprocal of the frequency.

(.....)

2. The simplest form of the oscillatory motion.

(.....)

**B. Give reasons for :**

1. When the periodic time of a tuning fork increases, the number of complete oscillations which made by it in one second will decrease.

2. The periodic motion of the clock hands is not considered an oscillatory motion.

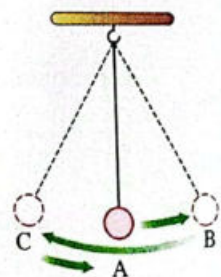
**4. A. Study the opposite figure, then answer the following questions :**

1. Point (A) represents .....

2. The distance  $\overline{AB}$  represents ..... and it equals the distance .....

3. The vibrating body has its maximum kinetic energy at point(s) .....

4. When the pendulum makes 600 complete oscillations in two minutes, its frequency = ..... and its periodic time = .....

**B. What happens when ... ?**

The ball of the pendulum reaches its maximum displacement away from its rest position (Concerning its velocity).

## Wave Motion

## Worksheet

## 3

## 1. A. Complete the following statements :

1. Wave motion is a kind of ..... motion.
2. Waves are classified according to ..... into mechanical waves and electromagnetic waves.

## B. Give reasons for :

1. Water waves are mechanical waves, while light waves are electromagnetic waves.

.....  
 .....

2. We see lightning before hearing thunder.

(El-Sahel Edu. Zone / Cairo 2022)

.....  
 .....

## 2. A. Put (✓) or (✗), then correct what is wrong :

1. The movement of the clock pendulum is considered as a wave motion. ( )

(Al-Montazah Edu. Zone / Alex. 2022)

.....

2. Visible light waves and radio waves are examples of electromagnetic waves. ( )

.....

3. Waves are classified according to the medium at which they propagate into transverse and longitudinal waves. ( )

.....

## B. Compare between :

(Heliopolis Modern Lang. Sch. / Cairo 2022)

Mechanical waves and electromagnetic waves.

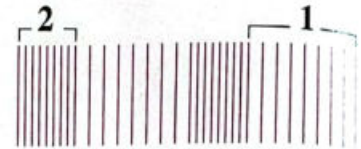
Mechanical waves	Electromagnetic waves
.....	.....
.....	.....
.....	.....
.....	.....



## 3. A. Define the wave.

(Shebeen El-Koum Edu. Zone / Monofia 2022)

## B. From the opposite figure :



1. What is the type of this wave ?

2. What are the scientific terms that indicated by the numbers (1), (2) ?

- No. (1) indicates : .....

- No. (2) indicates : .....

## 4. What happens when ... ?

1. You close a vibrating tuning fork to a burning candle.

2. The vibration of the medium particles along the direction of wave propagation. (Ismailia 2019)

## Worksheet 4

## 1. Complete the following :

1. Transverse waves are formed of ..... and ..... (Gharbia 2023)

2. The crest in the transverse wave corresponds to ..... in the longitudinal wave, while the trough corresponds to ..... (Baverly Hills sch. / Giza 2019)

3. The ..... is the lowest point of medium particles in the transverse wave.

4. In the transverse waves, the particles of the medium vibrate ..... the wave propagation direction, while in the longitudinal waves, the particles of the medium vibrate ..... the direction of wave propagation. (Patriarcal college / Cairo 2019)

## 2. A. What is meant by ...?

1. Wavelength of a transverse wave is 30 cm.

2. Rarefaction.

(Deir Mwas Official Sch. for Lang. / El-Menia 2022)

3. Crest.

4. The distance between the centres of successive compression and rarefaction equals 1 metre.



### B. Give reasons for :

1. The waves due to vibration of strings are mechanical transverse waves.

(El-Ma'aref Private sch. / Cairo 2019)

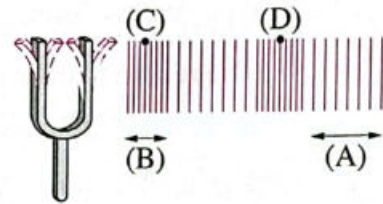
2. Jacuzzi is used in some hospitals and sport clubs.

### 3. A. Study the opposite figure, then answer the following :

1. Label points (A) and (B).

2. What is the kind of the produced waves ?

3. What's the name of the distance between (C) and (D) ?



### B. What are the results of ...?

1. The distance between two successive crests of a transverse wave is doubled.

2. Propagation of a wave in a medium as pulses of crests and troughs (Concerning the particles of the medium).

### 4. A. Choose the correct answer :

1. In the opposite figure, the particles of the medium (the coil) vibrate .....

- a. to the right only.
- b. upwards only.
- c. upwards and downwards.
- d. to the right and left.

2. .... wave is an example of the longitudinal waves. (El-Agamy zone / Alex. 2019)

- a. Water
- b. Sound
- c. Light
- d. Radio

3. If the distance between the centre of the third rarefaction and the centre of the fifth rarefaction on the wave propagation is 10 cm, then the wavelength of this wave is .....

- a. 40 cm.
- b. 20 cm.
- c. 10 cm.
- d. 5 cm.

### B. Write the scientific term :

1. The measuring unit of the wavelength. (.....)

2. A design consists of a tub, where water moves in the form of circular waves for treating sprains and cramps. (.....)



## Worksheet 5

## 1. A. What does each of the following relationship indicate ?

1.  $\frac{\text{Distance covered by the wave}}{\text{Time}} = \dots\dots\dots$
2.  $\frac{1}{\text{Frequency}} = \dots\dots\dots$
3.  $\frac{\text{Wave velocity}}{\text{Wave frequency}} = \dots\dots\dots$

(Patriarchal college / Cairo 2019)

## B. Write the scientific term :

1. The maximum displacement of medium particles away from their rest positions. (Cairo 2019) (.....)
2. The relation between the wave velocity, the wave frequency and the wavelength in the wave motion. (.....)
3. It is the time taken to make one wave. (.....)

## 2. A. What is meant by ...?

1. The velocity of all electromagnetic waves in space equals  $3 \times 10^8$  m/sec.  
.....
2. Frequency of a transverse wave is 50 waves/second.  
.....
3. The wavelength of a sound wave is 30 cm. (Assiut 2022)  
.....

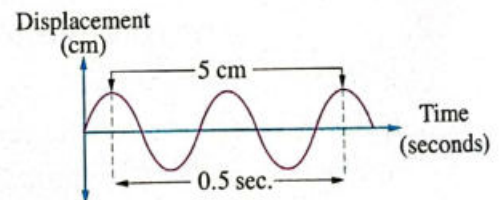
## B. Sound waves have frequency 400 Hz in air and its wavelength is 85 cm.

Calculate the velocity of these waves.

(Damietta 2023)

## 3. A. Complete the following :

1. From the opposite figure :
  - a) Wavelength = ..... cm.
  - b) Periodic time = ..... second.
2. Hertz is the measuring unit of .....
3. .... is the measuring unit of amplitude, while .... is the measuring unit of wave velocity.
4. The velocity of sound waves through air is ..... than its velocity through liquids, while its velocity through solids is ..... than that through liquids.





5. Wavelength =  $\frac{\text{Wave velocity}}{\dots\dots\dots}$

6. The wave frequency is  $\dots\dots\dots$  in one second.

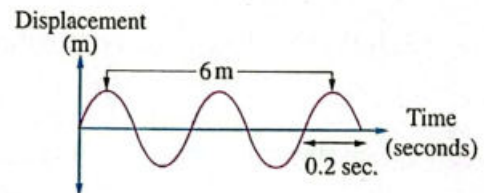
### B. What happens when ... ?

1. The frequency of a wave and its velocity of propagation decrease to quarter  
(Concerning its wavelength).  
 $\dots\dots\dots$

2. The frequency of a wave and its wavelength increase to double  
(Concerning the velocity of wave propagation).  
 $\dots\dots\dots$

### 4. A. From the opposite figure, find :

1. Wavelength.
2. The time of one wave (periodic time).
3. Frequency.
4. Wave velocity.



$\dots\dots\dots$

$\dots\dots\dots$

$\dots\dots\dots$

$\dots\dots\dots$

### B. From the opposite figure, choose the correct answer :

1. The periodic time =  $\dots\dots\dots$

- |           |           |
|-----------|-----------|
| a. 2 sec. | b. 8 sec. |
| c. 6 sec. | d. 3 sec. |

2. The frequency =  $\dots\dots\dots$

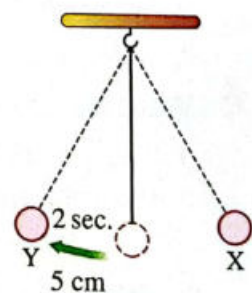
- |                             |            |
|-----------------------------|------------|
| a. 0.2 sec.                 | b. 0.4 Hz. |
| c. $\frac{1}{8}$ cycle/sec. | d. 0.4 m.  |

3. Amplitude =  $\dots\dots\dots$

- |             |            |          |          |
|-------------|------------|----------|----------|
| a. 0.2 sec. | b. 0.4 Hz. | c. 3 cm. | d. 5 cm. |
|-------------|------------|----------|----------|

4. The distance covered in a complete oscillation =  $\dots\dots\dots$

- |             |            |           |          |
|-------------|------------|-----------|----------|
| a. 0.2 sec. | b. 0.4 Hz. | c. 20 cm. | d. 5 cm. |
|-------------|------------|-----------|----------|





# General Exercise

## of the School Book



on Unit One

### 1. Choose the right answer :

- If the distance between the centre of the third compression and the centre of the fifth compression on the wave propagation is 20 cm, then the wavelength of this wave is .....  
 a. 40 cm.                      b. 20 cm.                      c. 10 cm.                      d. 5 cm.
- In the opposite figure, the particles of the medium (the coil) vibrate .....  
 a. to the right only.                      b. upwards only.  
 c. to right and left.                      d. upwards and downwards.
- If the frequency of an oscillating body was 6 Hz, then the periodic time is ..... second.  
 a. 6                      b. 3                      c.  $\frac{1}{3}$                       d.  $\frac{1}{6}$



### 2. Cross the odd word out. Then, state the relation among the remaining words :

- Sound wave - Light wave - Radio wave - Infrared wave.  
 .....
- Pendulum motion - Spring motion - Rotary motion - Stretched string motion.  
 .....

### 3. Give reasons for each of the following :

- Oscillatory motion is considered as a periodic motion.  
 .....
- The waves due to vibration of strings are mechanical transverse waves.  
 .....
- We see lightning before hearing thunder.  
 .....

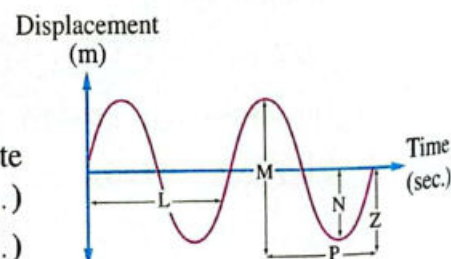
### 4. What are the results of ...?

- The vibration of the particles of a medium in a direction normal (perpendicular to) the direction of wave propagation.  
 .....
- The increase in the frequency of a wave to double its value with respect to the wavelength when the wave velocity is constant.  
 .....

### 5. The opposite figure represents an oscillatory motion for a simple pendulum.

Choose the letter that denotes :

- The oscillation of the pendulum forming  $\frac{3}{4}$  complete oscillation. (.....)
- The amplitude. (.....)





## Model Exam 1

56

Answer the following questions :

### Question 1 14 marks

**A** Choose the correct answer :

- If the periodic time of a tuning fork is 4 sec., so the frequency is .....  
 a. 4 Hz.                      b. 6 Hz.                      c.  $\frac{1}{4}$  Hz.                      d.  $\frac{1}{6}$  Hz. (Giza 2022)
- The sound waves are ..... waves.  
 a. mechanical longitudinal                      b. mechanical transverse  
 c. electromagnetic longitudinal                      d. electromagnetic transverse
- The wave transfers ..... in the direction of propagation. (Giza 2023)  
 a. molecules                      b. energy                      c. matter                      d. force
- The double of the horizontal distance between a crest and a trough of a transverse wave is known as the .....  
 a. frequency.                      b. wavelength.                      c. amplitude.                      d. wave velocity.

**B** Put (✓) or (✗) :

- The simple pendulum is an example of the oscillatory motion. ( )
- The periodic time is the time taken by the oscillating body to make one complete oscillation. ( )
- The wavelength for a longitudinal wave is the distance between the first crest and the second crest. ( )
- The transverse wave is a disturbance that causes the movement of medium particles from their positions. ( )

**C** Give a reason for :

The motion of a swing is an example of the oscillatory motion.

### Question 2 14 marks

**A** Write the scientific term :

- The measuring unit of wave velocity. (.....)
- Physiotherapy tubs which are used to treat sprains, cramps and nervous tension. (.....)
- Maximum displacement made by the oscillating body away from its rest position. (El-Seddeek Sch. / Cairo 2019) (.....)



4. It is the motion produced as a result of the vibration of the particles of the medium in a certain moment and in a definite direction. (.....)

(El-Ma'aref private sch. / Cairo 2019)

**B** Study the following figures, then answer the following questions :

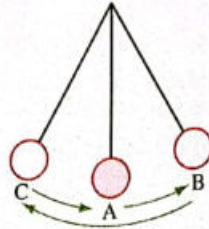


Fig. (1)

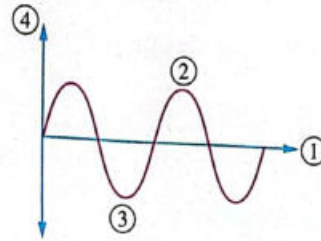


Fig. (2)

1. What are these figures represent ?

2. Label the figure (2).

① ..... ② ..... ③ ..... ④ .....

3. What is the number of displacements in fig. (1) ?

**C** Compare between :

Transverse wave and longitudinal wave (definition only).

.....  
.....  
.....

(Manor House Internationl sch. / Cairo 2019)

### Question 3 14 marks

**A** Complete the following statements :

1. Light is ..... waves but sound is ..... waves.

(El Seddeek sch. / Cairo 2019)

2. The crest in the ..... wave is equivalent to the ..... in the longitudinal wave.

(El-Bhaira 2022)

3. The complete oscillation includes ..... displacements, each is called .....

(Abou El-Nomros Edu. Zone / Giza 2022)

4. Waves are classified according to the ability to propagate and transfer energy into ..... and ..... waves.

(Heliopolis Modern Lang. Sch. / Cairo 2022)

**B** Correct the underlined words :

1. The movement of the clock pendulum is an example of wave motion. (.....)

(Al-Montazah Edu. Zone / Alex. 2022)



2. The kinetic energy of the pendulum decreases by increasing its velocity. (.....)

3. The simple harmonic motion is considered as the simplest form of transition motion.

(Educational Directorate / Ismailia 2019) (.....)

4. The relation between frequency and wavelength is constant relation.

(Middle zone science Inspectorate / Alex. 2019) (.....)

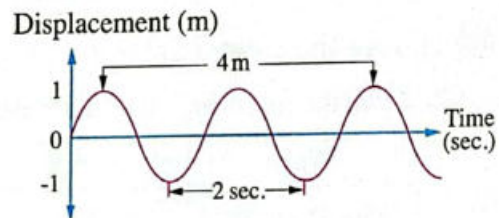
### C What is meant by ... ?

The distance covered by a water wave in one minute is  $9 \times 10^4$  m.

### Question 4 14 marks

#### A From the opposite figure, find :

1. Amplitude.
2. Periodic time.
3. Frequency.
4. Wavelength.



(Middle zone / Alex. 2019)

#### B Cross out the odd word. Then, state the relation among the remaining words :

1. Sound waves / Light waves / Infrared waves / Radio waves.

(Heliopolis Modern Lang. Sch. / Cairo 2022)

2. Water waves / Sound waves / Light waves / Pendulum motion.

3. Pendulum motion / Spring motion / Rotary bee motion / Stretched string motion.

(Heliopolis Modern Lang. Sch. / Cairo 2022)

4. Water waves / Sound waves / Microwaves / Infrared waves.

#### C What happens when ... ?

The frequency of a wave is doubled (concerning the wavelength) when the wave velocity is constant.

(Al-Resala Language sch. / Qaliubya 2019)



Answer the following questions :

**Question 1** 14 marks

**A** Complete the following statements :

1. If the wavelength of a sound wave is 2 metres, so the distance between the centre of the first compression and the fifth one in this wave = .....
2. 20 megahertz = ..... gigahertz.
3. Kinetic energy =  $\frac{1}{2}$  .....  $\times$  .....
4. Tuning fork is considered as one of the examples of ..... motion.

**B** Choose the correct answer :

1. From the following table, the wave ..... is considered as an electromagnetic wave.

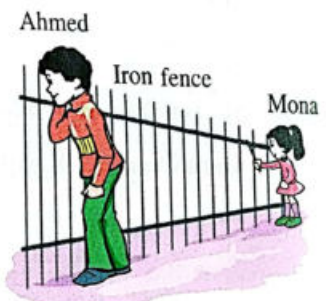
Wave	A	B	C	D
Velocity (m/sec.)	330	330	$3 \times 10^8$	$3 \times 10^8$
Type	Longitudinal wave	Transverse wave	Longitudinal wave	Transverse wave

- a. A                      b. B                      c. C                      d. D

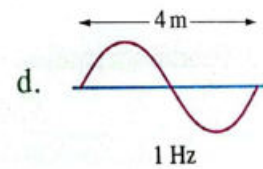
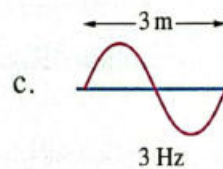
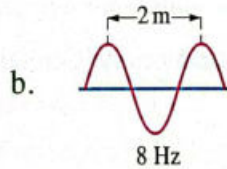
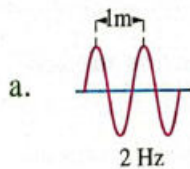
2. In the opposite figure :

Mona knocks on the iron fence. Then Ahmed hears the sound which transfers through air after 0.1 sec. and the sound which transfers through the iron fence after ..... sec.

- a. zero                      b. less than 0.1  
c. 0.1                      d. more than 0.1



3. The velocity of wave ..... is considered as the largest one.



4. Sound velocity is the greatest through .....

- a. vacuum.                      b. solids.                      c. liquids.                      d. gases.

(Orouba Language sch. / Giza 2019)

**C** What is meant by the velocity of a certain wave = 340 m/sec.

.....  
.....

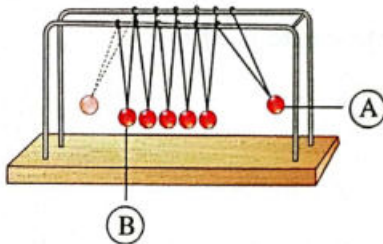

**Question 2** 14 marks

**A** Put (✓) or (✗) and correct what is wrong :

1. The rarefaction is the area in the longitudinal wave at which the particles of the medium are of the highest density and pressure.  
( ) .....
2. Wave velocity is constant in the different media.  
( ) .....
3. The motion of pendulum which includes 3 complete oscillations, includes 12 amplitudes.  
( ) .....
4. The transverse wave is a disturbance that causes the movement of medium particles from their positions.  
( ) .....

**B** Study the two following figures, then answer the questions followed by these figures :

**Fig. (1)**

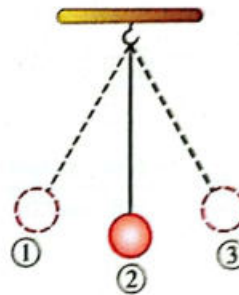


What is your explanation about the motion of ball (B) when ball (A) collides the other balls although ball (A) doesn't touch the ball (B) ?

.....

.....

**Fig. (2)**



**Choose :**

The velocity of the pendulum ball is very small at the position (s) .....

- a. ①
- b. ②
- c. ③
- d. ① and ③

**C** If the distance between the centre of the rarefaction and the centre of the successive compression in the longitudinal wave = 0.02 m. Calculate :

1. The wavelength of the longitudinal wave.  
.....
2. The wave velocity, if the frequency of this wave = 60 Hz.  
.....
3. The periodic time, if the frequency of this wave = 40 Hz.  
.....



**Question 3** 14 marks**A** Write the scientific term of each of the following :

1. The periodic motion made by a body around its point of rest, where the motion is repeated through equal intervals of time. (.....)
2. It is a disturbance in which the particles of the medium vibrate along the direction of wave propagation. (Patriarchal College / Cairo 2019) (.....)
3. The time taken by the oscillating body to make one complete oscillation. (.....)  
(Manor House / Cairo 2019)
4. The point of the lowest density and pressure in the longitudinal wave. (.....)  
(Middle zone / Alex. 2023)

**B** Correct the following statements without changing the underlined parts :

1. In wave motion, medium particles move from their places.  
.....
2. The motion of spring is considered as a circular periodic motion.  
.....
3. Wavelength =  $\frac{\text{Wave velocity}}{\text{Periodic time}}$   
.....
4. The amplitude equals double the complete oscillation.

**C** Give a reason for :

The frequency of the vibrating body decreases by increasing the periodic time.

.....

**Question 4** 14 marks**A** Choose from column (B) what suits it in column (A) :

(A)	(B)
1. Periodic time.	a. Hertz.
2. Amplitude.	b. sec.
3. Frequency.	c. m/sec.
4. Wave velocity.	d. cm.

1. .... 2. .... 3. .... 4. ....



**B** From the opposite figure, answer :

1. What is the kind of the produced wave ?

.....

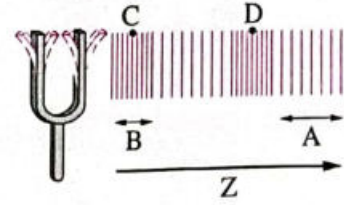
2. Label points (A) and (B).

.....

3. What's the name of the distance between (C) and (D) ?

.....

4. The arrow (Z) refers to the .....



(Damietta Educational Directorate / Damietta 2019)

**C** What is the importance of ... ?

Physiotherapy tubs (jacuzzi).

.....

(Borg Al-Arab Edu. Zone / Alex. 2022)



## Test

**1**

Total mark

10

Answer the following questions :

### A Choose the correct answer :

(8 marks)

- 1 The periodic time of an oscillating body which makes 240 oscillations in one minute equals .....  
 (a) 1 sec. (b)  $\frac{1}{4}$  sec.  
 (c)  $\frac{1}{2}$  sec. (d) 4 sec.
- 2 The number of complete oscillations produced by an oscillating body in one second is known as .....  
 (a) periodic time. (b) amplitude.  
 (c) frequency. (d) time of amplitude.
- 3 All of the following are transverse waves, except ..... waves.  
 (a) water (b) light (c) sound (d) radio
- 4 Rarefaction is the area at which the medium particles .....  
 (a) don't vibrate. (b) are too close to each other.  
 (c) are faraway from each other. (d) vibrate up and down.

### B What happens when ...?

(2 marks)

You throw a stone in water.

.....

.....

## Test

## 2

Total mark

10

Answer the following questions :

**A Choose the correct answer :**

(8 marks)

1 Kinetic energy =  $\frac{1}{2} \times \dots\dots\dots$

(a)  $\frac{m}{v^2}$

(b)  $mv^2$

(c)  $m^2v^2$

(d)  $mv^3$

2 All of the following are examples of oscillatory motion, except .....

(a) motion of a string.

(b) motion of a tuning fork.

(c) motion of a car.

(d) motion of a simple pendulum.

3 All of the following are the properties of mechanical waves, except .....

(a) they are longitudinal or transverse waves.

(b) they don't propagate through vacuum.

(c) they don't need a medium to propagate through.

(d) water and sound waves are examples of these waves.

4 ..... are mechanical waves.

(a) Radio waves only

(b) Light waves only

(c) Microwaves and sound waves

(d) Water waves and sound waves

**B Give a reason for the following :**

(2 marks)

Wave motion is considered as a periodic motion.

.....

.....



## Test

## 3

Total mark

10

Answer the following questions :

**A Choose the correct answer :**

(8 marks)

- 1 The periodic time of an oscillating body which makes ..... oscillations in one minute equals 0.25 second.
  - (a) 60
  - (b) 240
  - (c) 30
  - (d) 120
- 2 If the frequency of an oscillating body is 5 Hz, so the product of multiplying its frequency by its periodic time equals .....
  - (a) 1
  - (b) 5
  - (c) 10
  - (d) 25
- 3 The highest point of the particles of the medium in the transverse wave is known as the .....
  - (a) crest.
  - (b) compression.
  - (c) rarefaction.
  - (d) trough.
- 4 1 millimetre equals all the following values, except .....
  - (a)  $1 \times 10^6$  nanometre.
  - (b)  $1 \times 10^3$  micrometre.
  - (c)  $1 \times 10^{-3}$  metre.
  - (d)  $1 \times 10^{-3}$  micrometre.

**B What happens when ...?**

(2 marks)

The distance between two successive crests of a transverse wave is doubled.

---



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## Test

## 4

Total mark

10

Answer the following questions :

**A Choose the correct answer :**

(8 marks)

- 1 The number of complete oscillations produced by an oscillating body in one second is known as .....
- (a) periodic time. (b) amplitude.  
(c) frequency. (d) time of amplitude.
- 2 The frequency of the oscillating body is measured by a unit called .....
- (a) Hertz. (b) watt/m.  
(c) decibel. (d) m/sec.
- 3 The periodic time of a tuning fork which makes 120 waves in ..... equals  $\frac{1}{4}$  sec.
- (a) one second (b) half second  
(c) one minute (d) half minute
- 4 The mathematical relation between the velocity and wavelength is .....
- (a) velocity = frequency  $\times$  wavelength.  
(b) velocity = wavelength / frequency.  
(c) wavelength = frequency / velocity.  
(d) velocity = frequency / wavelength.

**B Give a reason for the following :**

(2 marks)

Frequency  $\times$  periodic time = 1

.....

.....



## Test

## 5

Total mark

10

Answer the following questions :

**A Choose the correct answer :**

(8 marks)

- 1 A simple pendulum makes 540 complete oscillations in a minute, so its frequency is ..... Hz.
  - (a) 3
  - (b) 6
  - (c) 9
  - (d) 12
- 2 1 Gigahertz = ..... Kiloherzt.
  - (a)  $10^2$
  - (b)  $10^3$
  - (c)  $10^6$
  - (d)  $10^9$
- 3 Transverse wave consists of .....
  - (a) compressions and rarefactions.
  - (b) troughs and rarefactions.
  - (c) compressions and crests.
  - (d) crests and troughs.
- 4 The distance between two successive crests or two successive troughs in the transverse wave is .....
  - (a) wavelength.
  - (b) wave velocity.
  - (c) amplitude.
  - (d) frequency.

**B What happens when ...?**

(2 marks)

The number of complete oscillations equals to the time taken by the vibrating body to make these oscillations.

---



---

## Answers of Test

**1**

A 1 (b)

2 (c)

3 (c)

4 (c)

B Concentric circles propagate on the water surface.

## Answers of Test

**2**

A 1 (b)

2 (c)

3 (c)

4 (d)

B Because it is repeated regularly in equal periods of time.

## Answers of Test

**3**

A 1 (b)

2 (a)

3 (a)

4 (d)

B The wavelength of the transverse wave is doubled.

## Answers of Test

**4**

A 1 (c)

2 (a)

3 (d)

4 (a)

B Because the frequency is the reciprocal of the periodic time , ( $F = \frac{1}{T}$ ).

## Answers of Test

**5**

A 1 (c)

2 (c)

3 (d)

4 (a)

B The value of frequency equals to that of periodic time.





# Lesson 1

## Homework

### 1) Complete:-

1- Oscillatory motion is

.....

2- The velocity of the oscillating body ..... as the kinetic energy increases.

3- ....., ....., ..... are examples of oscillatory motion.

4- If the maximum displacement done by the oscillating body away from its original position is 0.2 cm which is made in 0.5 seconds, so its amplitude is.....and the periodic time is .....

5- Megahertz equals.....Hz and gigahertz equals.....Hz

6- Periodic time (T) =  $\frac{\text{.....}}{\text{.....}}$  =  $\frac{\text{.....}}{\text{.....}}$

7- As the periodic time increases, the frequency .....

### 2) Write the scientific term:-

1- It's the maximum displacement done by an oscillating body away from its point of rest. (.....)

2- The no. of complete oscillations done by the oscillating body in one second. (.....)

3- The motion done by an oscillating body when it passes by its point of rest 2 consecutive times . (.....)

4- It's the reciprocal of the periodic time. (.....)

5- It comprises 4 amplitudes. (.....)





### 3) Give reasons for:-

1- The movement of the rotary bee is not considered as a periodic motion

.....

2- As the periodic time increases the frequency decreases

.....

3- The product of frequency and periodic time equals unity.

.....

### 5- Put (✓) or (x) :

1- The oscillating body which its frequency is 20 HZ takes 20 seconds to make one complete oscillation. ( )

2- The motion of stretched string is considered as a wave motion ( )

### 6- What is meant by :

1- The frequency of tuning fork is 400 HZ.

.....

.....

2- The amplitude of an oscillating body is 0.4 meter.

.....

.....

3- 1500 is the no of complete cycle in 3sec.

.....

.....

4- The distance between two points one of them the K.E is zero and the other is max.

.....

.....

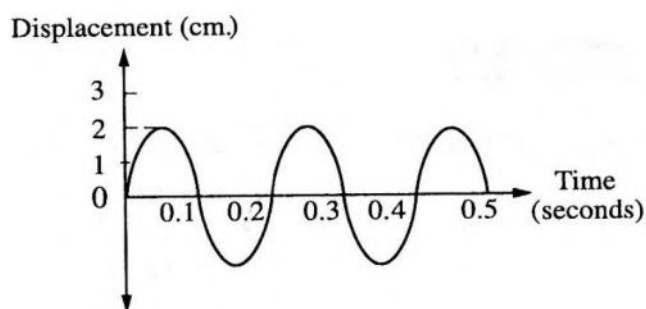






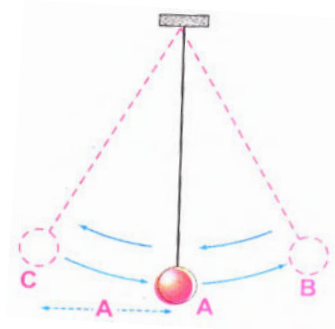
**7- From the opposite figure of the oscillatory motion of a simple pendulum , calculate**

- 1) Amplitude .....
- 2) Periodic time .....
- 3) Frequency .....



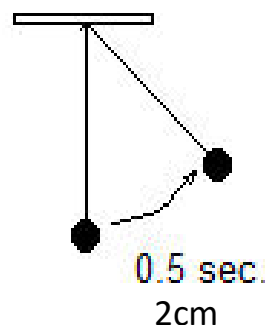
**8- In the following figure, If the pendulum covers the distance AB in 0.01 sec. and the distance AB = 5 cm. find the following**

- 1- The periodic time
- 2- The frequency
- 3- The length of the complete oscillation



**9- In the following figure,. find the following**

- 1- The periodic time
- 2- The frequency
- 3- The length of the complete oscillation
- 4- Amplitude.



**10-** Calculate the number of complete oscillation that are made by a body in 2 minutes if its frequency is 6 Hz.

.....

.....

.....

.





## Lesson 2

# Homework

### 1) Complete:-

- 1- The wave is .....
- 2- The wave transfers the energy to the particles of the medium without .....
- 3- Waves are classified into ..... & ..... according to the direction of medium particles vibration.
- 4- Waves are classified into ..... & ..... according to the types of energy which they carry
- 5- The transverse wave is composed of ..... &.....
- 6- The longitudinal wave is composed of ..... & .....
- 7- Transverse waves as ..... while longitudinal waves as .....
- 8-If the distance between the centers of 2<sup>nd</sup> and 7<sup>th</sup> crests is 30 cm so the wave length is .....

### 2) Write the scientific term:-

- 1- It's the highest point in the transverse wave. (.....)
- 2- It's the highest density pressure in the longitudinal wave. (.....)
- 3- It's the lowest point in the transverse wave. (.....)
- 4- It's the product of frequency & wave length. (.....)







5- It's the disturbance that occurred in a medium transferring energy in a certain direction at a certain time (.....)

### 3) What happens if:

1- Sound is produced under the water surface.

.....

2- The distance between 2 consecutive crests increases.

.....

### 4) G . R . F

1- We don't hear the sound of the sun explosions

.....

2- Radio waves are considered as electromagnetic transverse waves.

.....

3- The sound waves are mechanical longitudinal waves.

.....

4- Sound waves aren't considered as oscillatory motion.

.....

### 6) Compare between:

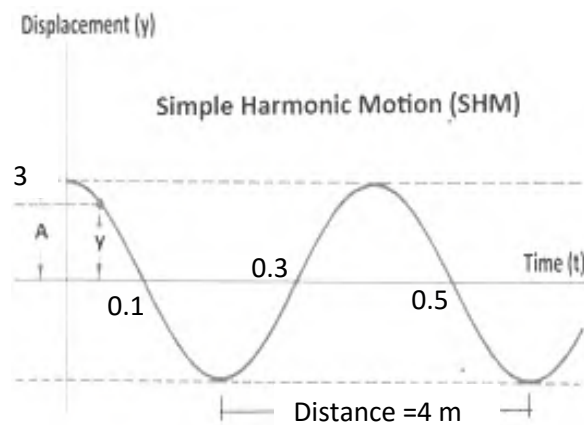
P.O.C	Transverse waves	longitudinal waves
Example		
Definition		





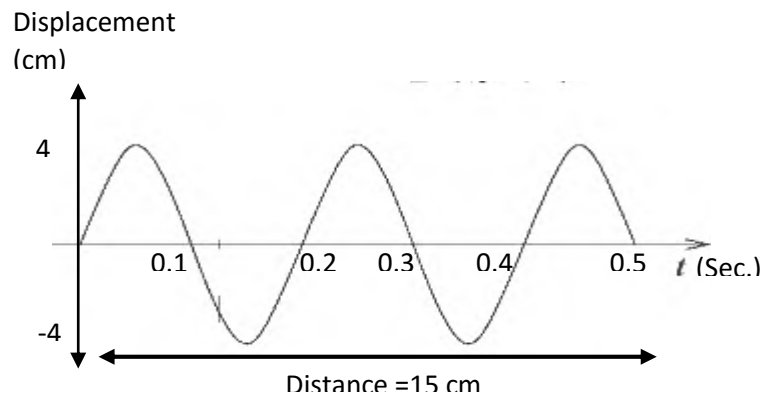
**7- from the opposite figure Find:**

- 1- Amplitude.
- 2- Wave length.
- 3- Periodic time.
- 4- Frequency.
- 5- Wave velocity.



**8- from the opposite figure Find:**

- 1- Amplitude.
- 2- Wave length.
- 3- Periodic time.
- 4- Frequency.
- 5- Wave velocity.



**9-Answer the following problem:**

The velocity of the propagation of a sound wave through wood is 1800 m/sec. Find the frequency of the sound source if the wave length of the produced wave is 6 meters

.....

.....

.

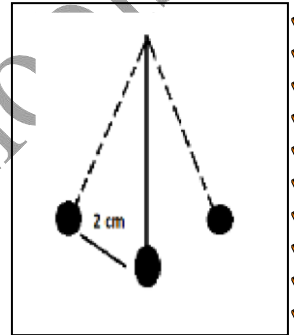




# Worksheet

## Q.(1): Choose the correct answer:

- If the frequency of this oscillating body is 6Hz, then the periodic time equal to .....  
( 6 -  $\frac{1}{3}$  -  $\frac{1}{6}$  - 3 )
- From the opposite figure the amplitude equal.....  
( 1 - 2 - 3 - 4 ) and the complete oscillation equal .....  
( 2 - 4 - 6 - 8 ) cm
- If the periodic time of oscillating body is 0.1 sec. so the number of complete oscillations in one minute equal.  
( 10 - 600 - 120 - 60 )



## Q.(2): Write the scientific terms:

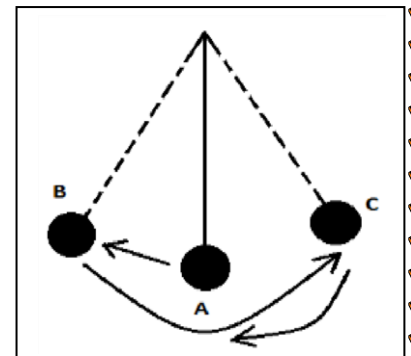
- The motion made by oscillating body passing through one point two successive times at the same direction. (.....)
- The motion which regularly repeated in equal intervals of time. (.....)
- The measuring unit of frequency. (.....)

## Q.(3): Complete:

- A complete oscillation comprises .....successive displacements each one called .....
- The velocity of oscillating body reaches its maximum value when it passes at the .....
- The equal of multiplying the frequency of an oscillating body and its periodic time is.....

## Q.(4): From the opposite figure:

- (A) point represents .....
- (A-B) space represents.....



3. The path (A-B, B – C, C-A) represents .....

4. In which point the velocity of the pendulum reaches its maximum value?

Q.(5): Give reasons:

1-The microwave can cook the food faster than the flame ?

2-Metal pots should not be used in the microwave

Q.(6): What's meant by:

1. The frequency of the oscillating body?

2. The no. of complete oscillations of an oscillating body in 10 sec. is 500 complete oscillations?

3. Oscillating body make 540 oscillations in a minute and a half?

4. The maximum amplitude made by oscillating body is 60 cm?

5. Oscillating body covers a distance 20 cm in one complete oscillation

*Do your best*





# Worksheet

## Q.(1): From the opposite figure:

1- The amplitude is .....

( 2cm – 3cm – 4cm – 8cm ) .

2- The periodic time .....

(  $\frac{1}{8}$  Hz – 4s – 0.25Hz – 8s ) .

3- The frequency is .....

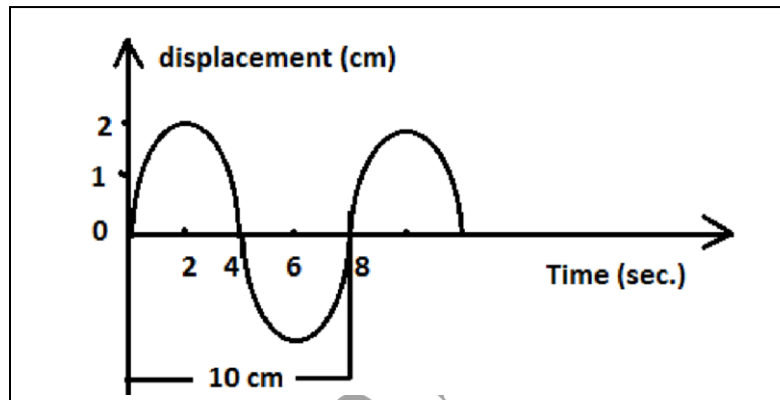
( 8s – 4s -  $\frac{1}{8}$  Hz -  $\frac{1}{4}$  Hz ) .

4- The wavelength is .....

( 4cm – 0.25Hz –  $\frac{1}{8}$  cm – 10cm ) .

5- The wave velocity is .....

( 1m/s – 0.2m/s – 4m/s – 0.0125m/s ) .



## Q.(2): Complete:

1. The hertz is the measuring unit of .....
2. .... and ..... Are examples of periodic motion.
3. The wavelength of the transverse wave is the distance between ..... and .....
4. The Jacuzzi is used treat the cramps by ..... water and nervous tension by ..... water.
5. The velocity of the wave is constant in the .....
6. The mechanical wave could be ..... and .....

## Q.(3): Write the scientific term:

1. The distance between two successive compressions or rarefaction.  
( ) .
2. The lowest point of density and pressure in the longitudinal wave.

(.....).

3. The wave which doesn't need a medium to propagate and transfer energy.

(.....).

4. The time which required by the source to produce one wave.

(.....).

**Q.(4): What's meant by:**

1. A wavelength of a sound wave is 20cm?
2. The amplitude of a vibrating source is 5cm?
3. The distance between two successive crests in water wave 10 m?
4. The law of wave propagation?

**Q.(5): Put (  $\checkmark$  ) or ( X ) :**

- 1-Light and water waves are examples of electromagnetic waves. ( )
- 2-The frequency of a wave is directly proportional to the wavelength through the same medium. ( )
- 3-Transverse wave formed of crests and troughs. ( )
- 4-The velocity of the wave is the distance covered by the wave in one second. ( )

***Don't give up*** 



## Revision on lesson one

### Complete the following:

1. The maximum displacement achieved by the oscillating body away from its rest position is .....
  2. Kinetic energy =  $\frac{1}{2} * \dots$
  3. The amplitude of the simple pendulum is .....
  4. The maximum displacement achieved by the oscillating body away from rest position is .....
  5. The result of multiplying the frequency as an oscillating body by its periodic time equals .....
- 

### Write the scientific term of each of the following:

1. The periodic motion made by a body around its point of rest, where the motion its repeated through equal intervals of time. ( )
  2. The number of complete oscillations produced by the oscillating body in one second. ( )
- 

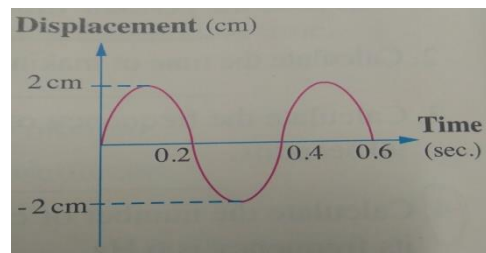
### Give reason for:

1. The oscillatory motion is considered as a periodic motion.  
.....  
.....
  2. The motion of rotary bee is a periodic motion only, but it is not an oscillatory motion.  
.....  
.....
- 

### Problems:

1. From the following figure , choose the correct answer:

- a) The periodic time = .....  
(0.2 sec. , 0.4sec , 0.6 sec , 0.4)
- b) Frequency = .....  
(0.2 sec. , 0.4HZ , 2.5cycle \ sec , 0.4m)
- c) The amplitude = .....  
(0.2 sec. , 0.4sec , 2cm , 0.4cm)



2. Calculate the number of complete oscillations that are made by a body in 2 minutes if its frequency is 6 HZ.
3. If the oscillating body makes 480 complete oscillations in one minute, calculate:
  - a. Frequency
  - b. periodic time

## Revision on lesson two

### Complete the following statements:

1. waves are classified according to the ability to propagate and transfer energy into ..... and .....
  2. radio waves are considered as ..... waves that propagate through free space with a velocity of.....
  3. The crest in the..... Wave is equivalent to the..... in the longitudinal wave.
  4. Jacuzzi is used to treat..... and cramps by using hot water and..... By using cold water.
  5. The longitudinal wave consists of ..... and.....
- 

### Write the scientific term:

1. A disturbance that propagate and transfers energy along the direction of propagation. ( )
  2. The highest point of the particles of the medium in the transverse wave. ( )
  3. The area in longitudinal wave at which the medium particles are are of the highest density and pressure. ( )
  4. The relationship between wave velocity, frequency and the wavelength in the wave motion. ( )
- 

### Give reason for:

1. The waves produced due to vibration of a string are transverse mechanical waves.

.....

2. We see lightning before hearing thunder.

.....

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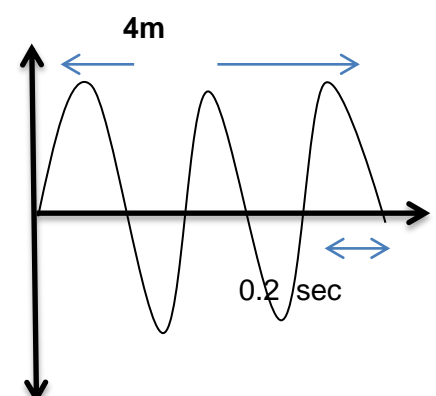
### Problems:

Sound waves of frequency 200Hertz and wavelength in air 1.7metre. Calculate:

- a. the velocity of sound waves propagation in air.
  - b. the wavelength of these waves when they propagate in water with velocity 1500m/s.
- 

from the opposite figure, find:

- 1) wave length
- 2) Frequency
- 3) Amplitude
- 4) wave velocity.



## Revision on unit one

### 1) choose the correct answer:

1. if the periodic time of a tuning fork is 4sec., so the frequency is.....
  - a. 4Hz
  - b. 6Hz
  - c.  $\frac{1}{4}$ Hz
  - d.  $\frac{1}{6}$ Hz
2. the sound waves are ..... Waves.
  - a. mechanical longitudinal
  - b. mechanical transverse
  - c. electromagnetic longitudinal
  - d. electromagnetic transverse.
3. The wave transfers..... in the direction of propagation.
  - a. molecules
  - b. energy
  - c. matter
  - d. force
4. The double of the horizontal distance between a crest and a trough of a transverse wave is known as the .....
  - a. frequency
  - b. wavelength
  - c. amplitude
  - d. wave velocity

### 2) write the scientific term:

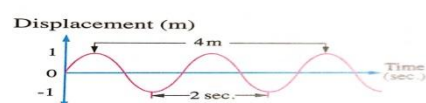
1. The measuring unit of wave velocity. (            )
2. Physiotherapy tubs which are used to treat sprains , cramps and nervous tention. (    )
3. Maximum displacement made by the oscillating body away from in rest position. (    )
4. It is the motion produced as a result of the vibration of the particles of the medium in a certain moment and in a definite direction. (            )

### 3) Complete the following:

1. Light is ..... waves but sound is ..... waves.
2. The crest in the ..... wave is equivalent to the ..... in the longitudinal wave.
3. The complete oscillation includes ..... displacements, each is called.....
4. Waves are classified according to the ability to propagate and transfer energy into..... and ..... waves.

### 4) From the opposite figure, find:

- 1) Amplitude.
- 2) Periodic time.
- 3) Frequency.
- 4) Wavelength.







# February Revision

**Mr. Ahmed Elbasha**

★ **(1) Write the scientific term:**

- 1 The distance covered by the wave in one second. (.....)
- 2 Maximum displacement of the oscillating body away from its rest position. (.....)
- 3 It is a disturbance in which the particles of the medium vibrate along the direction of wave propagation. (.....)
- 4 The motion produced as a result of the vibration of the particles of the medium at a certain moment in a definite direction. (.....)
- 5 The number of complete oscillations produced by the oscillating body in one second. (.....)
- 6 The time taken by the oscillating body to make one complete oscillation. (.....)
- 7 The highest point in the transverse wave. (.....)
- 8 Waves that need medium to travel and can't travel in space (.....)
- 9 The point of the lowest density and pressure in the longitudinal wave (.....)
- 10 The time needed by the oscillatory body to make a complete oscillation. (.....)
- 11 The maximum displacement achieved by an oscillating body away from its point of rest. (.....)
- 12 The area in the longitudinal wave, at which the medium particles are of the highest density and pressure (.....)
- 13 Wave consists of crests and troughs. (.....)
- 14 The waves which need a medium to propagate. (.....)
- 15 The motion produced because of the vibration of the particles of the medium at a certain moment and in a certain direction (.....)
- 16 The distance between two successive compressions or rarefactions in a longitudinal wave. (.....)

**\*(2) Choose the right answer:**

1. The amplitude of the simple pendulum is ..... of a complete vibration.  
a. four times.                      b. a quarter.                      c. a half.                      d. double.
2. Light waves are ..... waves.  
a. mechanical transverse                      b. electromagnetic longitudinal  
c. electromagnetic transverse                      d. mechanical longitudinal
3. Speed of ball of simple pendulum ..... as we move away from the rest position.  
a. doesn't affect                      b. decreases                      c. is doubled                      d. no correct answer
4. If the distance between the center of the third compression and that of the fifth compression is 20 cm, the wavelength of this wave is .....  
a. 40 cm.                      b. 20 cm.                      c. 10 cm.                      d. 5 cm.
5. The distance between two successive compressions is called .....  
a. frequency.                      b. periodic time.                      c. wavelength.                      d. velocity.
6. The periodic time of a tuning fork which makes 240 waves in one minute equals ....  
a. 1 sec.                      b. 4 sec.                      c. 0.5 sec.                      d. 0.25 sec.
7. .... waves are longitudinal waves.  
a. Water                      b. Light                      c. Sound                      d. Radio
8. The measuring unit of wave velocity is .....  
a. metre.                      b. metre/sec.                      c. Hz.                      d. sec.
9. All the following are electromagnetic waves except ..... waves.  
a. light                      b. sound                      c. infrared                      d. radio
10. The maximum displacement made by the oscillating body away from its original position is .....  
a. amplitude.                      b. frequency.                      c. periodic time.                      d. complete.
11. Velocity of sound in air equals ..... m/s.  
a. 340                      b. 1500                      c.  $3 \times 10^8$
12. The result of multiplying frequency of an oscillating body by its periodic time equals .....  
a. one.                      b. negative value.                      c. constant value.                      d. variable value.
13. Each complete oscillation consists of ..... amplitudes.  
a. 3                      b. 4                      c. 2                      d. 5

### ✱(3) Complete the following :

1. The crest in the ..... wave is equivalent to the ..... in the longitudinal wave.
2. Transverse wave consists of ..... and .....
3. Waves are classified according to the ability to propagate and transfer energy to ..... and ..... waves.
4. Complete oscillation consists of ..... displacements (amplitudes).
5. Sound wave velocity = ..... x .....
6. Sound travels through air as pulses of ..... and .....
7. .... are transverse waves, while ..... waves may be longitudinal or transverse waves.
8. There are two types of periodic motion which are ..... motion and ..... motion.
9. Sound waves are longitudinal waves because particles of the medium vibrate ..... the direction of wave propagation.

### ✱(4) Correct the underlined words:

1	The crest in the transverse wave is equivalent to the <u>bottom</u> in the longitudinal wave	( ..... )
2	The movement of the clock pendulum is an example of <u>wave motion</u> .	( ..... )
3	<u>Oscillatory</u> motion is the motion that is repeated regularly in equal periods of time.	( ..... )
4	Speed of sound in water is slower than in <u>air</u> .	( ..... )
5	The result of multiplying the frequency of an oscillating body by its periodic time equals <u>variable value</u> .	( ..... )
6	Particles of the medium vibrate along the direction of the wave propagation in the <u>transvers waves</u> .	( ..... )



**\*(5) Give reason for:**

1. The periodic time decreases as the number of complete oscillations increases.  
.....  
.....
2. The waves produced due to vibration of strings are transverse mechanical waves.  
.....  
.....
3. Sound waves are mechanical waves while radio waves are electromagnetic waves.  
.....  
.....
4. Light can travel through free space.  
.....  
.....
5. We see lightning before hearing thunder.  
.....  
.....
6. Oscillatory motion is considered as a periodic motion.  
.....  
.....
7. Sound can be heard from all surrounding directions.  
.....  
.....
8. Water waves are mechanical transverse waves.  
.....  
.....
9. A light wave are considered electromagnetic waves.  
.....  
.....

**\*(6) What happen if:**

1. The frequency of an oscillating body increases (concerning its periodic time) .  
.....
2. The oscillating body passes its rest position during its movement  
(Concerning its velocity).  
.....
3. The frequency of a wave is doubled (concerning the wavelength) when the wave  
velocity is constant.  
.....
4. Vibration of particles of a medium perpendicularly to the direction of wave  
propagation.  
.....
5. The sound wave travels from solid to water (concerning its velocity)  
.....

### ★(7) Put ( $\checkmark$ ) or ( X ) :

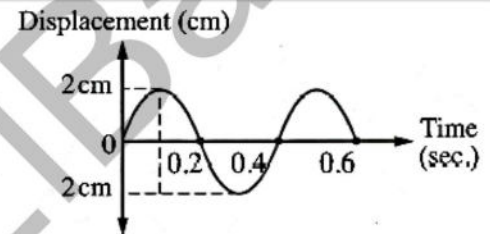
1. The movement of pendulum is an example for wave motion. (     )
2. Sound can be heard from all directions that surround the sound source. (     )
3. Sound velocity through liquids is more than that through gases. (     )
4. The particles of the medium vibrate along the direction of the wave propagation in longitudinal wave (     )
5. Light waves are electromagnetic transverse wave. (     )
6. The sound velocity through solids is less than that through liquids. (     )
7. The transverse wave consists of compressions and troughs. (     )

### ★(8) Problems

1

From the opposite figure, calculate :

1. Amplitude.
2. Periodic time.
3. Frequency.



.....

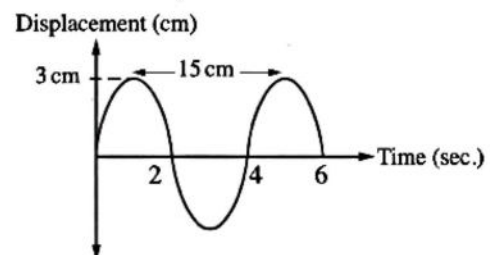
.....

.....

2

From the opposite figure, calculate :

1. Wavelength.
2. Frequency.
3. Amplitude.
4. Periodic time.



.....

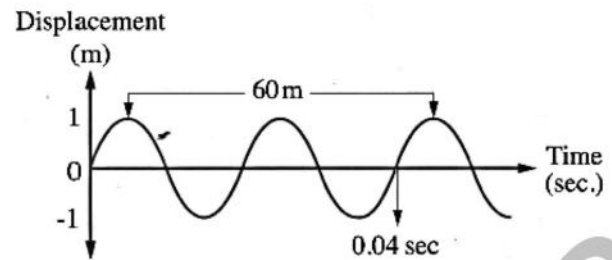
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3

From the opposite figure, calculate :

1. Frequency.
2. Wavelength.
3. Velocity of the wave.



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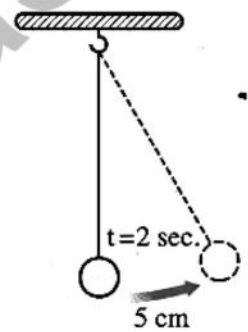
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From the opposite figure, calculate the following :

1. Amplitude.
2. Periodic time.
3. Frequency.



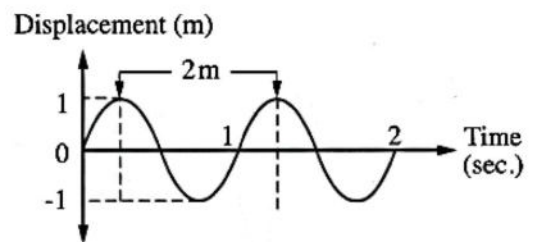
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From the opposite figure, find :

1. Wavelength.
2. Frequency.
3. Amplitude.
4. Wave velocity.



.....

.....

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## Model Answer

### ✱ (1) Write the scientific term :

- |                      |                     |                      |                                      |
|----------------------|---------------------|----------------------|--------------------------------------|
| 1. Wave velocity     | 6. Periodic time    | 11. Amplitude        | 16. Wavelength of longitudinal waves |
| 2. Amplitude         | 7. Crest            | 12. Compression      |                                      |
| 3. Longitudinal wave | 8. Mechanical waves | 13. Transvers waves  |                                      |
| 4. Wave motion       | 9. Rarefaction      | 14. Mechanical waves |                                      |
| 5. Frequency         | 10. Periodic time   | 15. Periodic motion  |                                      |

### ✱ (2) Choose the right answer:

- |      |      |      |      |      |
|------|------|------|------|------|
| 1. B | 4. C | 7. C | 10.A | 13.B |
| 2. C | 5. C | 8. B | 11.A |      |
| 3. B | 6. D | 9. B | 12.A |      |

### ✱ (3) Complete the following:

- |                                 |                              |                                 |
|---------------------------------|------------------------------|---------------------------------|
| 1. Transverse – compression     | 4. Four                      | 7. Electromagnetic – mechanical |
| 2. Crest - trough               | 5. Frequency x wavelength    | 8. Oscillatory – wave           |
| 3. Electromagnetic – mechanical | 6. Compression – rarefaction | 9. Along                        |

### ✱ (4) Correct the underlined words:

- |                |             |                       |
|----------------|-------------|-----------------------|
| 1. Compression | 3. Periodic | 6. Longitudinal waves |
| 2. Oscillatory | 4. Solid    |                       |
|                | 5. One      |                       |

### ✱ (5) Give reason for:

1. Because the number of complete oscillations is inversely proportional to the periodic time.
2. They are transverse because the medium particles vibrate perpendicular to the direction of wave propagation forming crests and troughs and mechanical because they need a medium to propagate through.
3. Because sound waves need a medium to propagate through, while radio waves don't need a medium to propagate through.
4. Because it is electromagnetic waves which don't need a medium to travel through.
5. Because the velocity of light waves of lightning (electromagnetic waves) is much greater than that of sound waves of thunder (mechanical waves).
6. Because it is repeated regularly in equal periods of time.
7. Because sound travels through air as spheres of compressions and rarefactions whose center is the sound source
8. They are transverse because the medium particles vibrate perpendicular to the direction of wave propagation forming crests and troughs and mechanical because they need a medium to propagate through.
9. Because Light waves don't need a medium to propagate through.

### \*(6) What happen if:

1. The periodic time will decrease
2. Its velocity increases to the maximum value.
3. The wavelength decreases to its half value.
4. Transverse waves are formed
5. Sound velocity will decrease, since velocity of sound through solids is higher than the velocity of sound through liquids

### \*(7) Put ( $\checkmark$ ) or ( X ) :

- |                     |                     |          |
|---------------------|---------------------|----------|
| 1. ( X )            | 4. ( $\checkmark$ ) | 7. ( X ) |
| 2. ( $\checkmark$ ) | 5. ( $\checkmark$ ) |          |
| 3. ( $\checkmark$ ) | 6. ( X )            |          |

### \*(8) Problems

<b>1</b>	1. Amplitude = 2 cm = 0.02 m. 2. Periodic time = 0.4 sec. 3. Frequency = $\frac{1}{\text{Periodic time}} = \frac{1}{0.4} = 2.5 \text{ Hz.}$	<b>5</b>	1. Amplitude = 5 cm = 0.05 m. 2. Periodic time = $4 \times 2 = 8 \text{ sec.}$ 3. Frequency = $\frac{1}{\text{Periodic time}} = \frac{1}{8} = 0.125 \text{ Hz.}$
<b>2</b>	1. Wavelength = 15 cm = 0.15 m. 2. Frequency = $\frac{1}{4} = 0.25 \text{ Hz.}$ 3. Amplitude = 3 cm = 0.03 m. 4. Periodic time = $\frac{1}{0.25} = 4 \text{ sec.}$	<b>6</b>	1. Wavelength = 2 m. 2. Frequency = $\frac{\text{Number of complete oscillations}}{\text{Time in seconds}} = \frac{2}{2} = 1 \text{ Hz.}$ 3. Amplitude = 1 m. 4. Wave velocity = Wavelength $\times$ Frequency $= 2 \times 1 = 2 \text{ m/sec.}$
<b>3</b>	1. Frequency = $\frac{2}{0.04} = 50 \text{ Hz.}$ 2. Wavelength = $\frac{60}{2} = 30 \text{ m.}$ 3. Wave velocity = Frequency $\times$ Wavelength $= 50 \times 30 = 1500 \text{ m/sec.}$		

# 2<sup>nd</sup> Prep. Feb. revision



## (1) Write the scientific term:

- 1- It is a motion which is regularly repeated in equal periods of time. ( )
- 2- It is the motion of oscillating body around its rest point, where the motion is repeated through equal intervals of time. ( )
- 3- It is the maximum displacement done by the oscillating body away from its original position. ( )
- 4- It is the motion of an oscillating body when it passes by a fixed point on its path two successive times in the same direction. ( )
- 5- It is the time taken by an oscillating body to make one complete oscillation. ( )
- 6- It is number of complete oscillations made by an oscillating body in one second. ( )
- 7- It is the disturbance that propagates and transfers energy in the direction of propagation. ( )
- 8- It is the motion produced as a result of the vibration of the medium particles at a certain moment and in a definite direction. ( )
- 9- It is the direction through which the wave propagates. ( )
- 10- It is a disturbance in which the particles of the medium vibrate perpendicular to the direction of wave propagation. ( )
- 11- It is the highest point of the particles of the medium in the transverse wave. ( )



12- It is the lowest point of particles of the medium in the transverse wave.

( )

13-It is the area at which the particles of the medium are of highest density and pressure

( )

14-It is the area at which the medium particles are of lowest density and pressure.

( )

15- It is the distance between two successive crests or troughs. ( )

16-It is the distance between the centers of two successive compressions or rarefactions.

( )

17-It is the maximum displacement achieved by the medium particles away from their rest positions.

( )

18- It is the distance covered by the wave in one second. ( )

19- It is the number of waves produced from the source in one second.

( )

20- Simplest form of oscillatory motion.

( )

## **(2) Give reason for:**

1- The oscillatory motion is considered as a periodic motion.

.....

2- Water waves are transverse waves.

.....

3- Sound waves are longitudinal waves.

.....

4- Sound waves are mechanical waves, while radio waves are electromagnetic waves.

.....

5- Hearing thunder after seeing lightning though they happen at the same time.

6- We can't hear the sound of solar explosions occurring on the sun, but we can see the light coming out of it.

### **(3) Compare between each of the following:**

1) Mechanical waves and electromagnetic waves

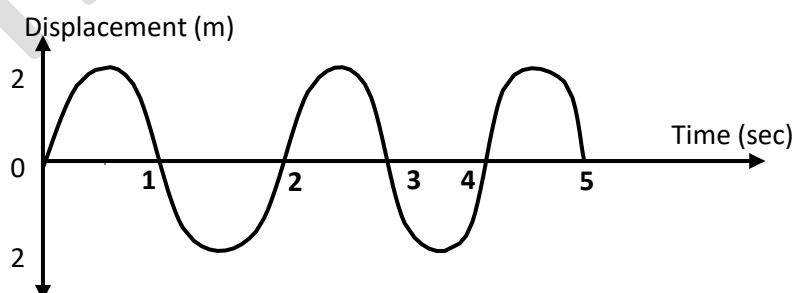
2) Transverse and longitudinal waves.

3) Oscillatory and wave motion.

### **(4) Problems:**

1- From the opposite figure of the oscillatory motion of a simple pendulum, calculate:

- a) Amplitude.
- b) Periodic time.
- c) Frequency.



2- Calculate the periodic time and frequency for an oscillating body that makes 500 complete oscillations in two minutes.

.....

.....

.....

.....

.....

3- Calculate the wave length in meter for a visible light wave of frequency  $5 \times 10^8$  hertz and velocity of  $3 \times 10^8$  m/s

.....

.....

.....

.....

.....

4-A longitudinal wave is produced by a spiral spin such that the distance between the first and fourth compression is 24 m find the wave velocity if the frequency of such wave is 20 Hertz.

.....

.....

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.....

5)Calculate the wave length of a sound wave propagating through sea water with velocity 1500 m/sec knowing that its frequency is 100 hertz.

.....

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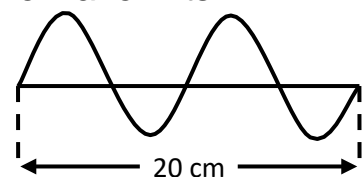
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6)From the opposite figure, calculate the velocity of the wave if its frequency is 25 Hertz.

.....

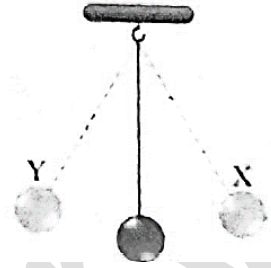
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- 7) From the opposite figure, when the ball of pendulum move from (X) to (Y) In 0.02 sec . find the frequency .

.....  
 .....



### **(5) What is meant by each of the following?**

- 1- The time taken by spring to make 60 complete oscillations is 1 minute.  
 .....
- 2- The frequency of simple pendulum is 50 Hz.  
 .....
- 3- Wave length of sound wave is 30 cm.  
 .....
- 4- Amplitude of vibrating source is 5 cm.  
 .....

## Unit 1 Exam

هذا الاختبار يجيب عنه الطالب بنفسه  
ثم تابع حصة البث المباشر التي  
سيعطى عنها للحصول على الإجابة

### 1-A -Choose the correct answer:

1-If the periodic time of an oscillating body is 0.1 sec., so the number of complete oscillations in one minute is .....

- a. 10                      b. 600                      c. 120                      d. 60

2-All of the following are examples of oscillatory motion, except

- a. motion of a string.                      c. motion of a tuning fork.  
b. motion of a car.                      d. motion of a simple pendulum.

3-The sound waves are .....waves.

- a. mechanical longitudinal                      c. electromagnetic longitudinal  
b. mechanical transverse                      d. electromagnetic transverse

4- If the distance between the center of the third compression and the center of the fifth compression on the wave propagation is 20 cm, then the wavelength of this wave.....

- a. 40 cm.                      b. 20 cm.                      c. 10 cm.                      d. 5 cm.

### B- Give reasons for :

1-Oscillatory motion is considered as a periodic motion.

.....

2-The frequency of the vibrating body decreases by increasing the periodic time.

.....

### 2- A - What is the importance of ...?

Physiotherapy tubs (jacuzzi).....

### B-Put (✓) or ( X ) and correct the wrong ones:

1-The transverse wave is a disturbance that causes the movement of medium particles from their positions ( )

2- The velocity of the oscillating body reaches its maximum value when it passes its rest position ( )

3-The motion of pendulum which includes 3 complete oscillations, includes 12 amplitudes. ( )

4-Wave velocity is constant in the different media. ( )

### 3- A - Write the scientific term of each of the following:

1- Maximum displacement made by the oscillating body away from its rest position. ( )

2- The point of the lowest density and pressure in the longitudinal wave. ( )

- 3- The periodic motion made by a body around its point of rest, where the motion is repeated through equal intervals of time ( )
- 4- The inverse of the frequency. ( )

**B - What are the results of ..?**

1-The increase in the frequency of a wave to double its value with respect to the wavelength when the wave velocity is constant

.....

2-The distance between two successive crests of a transverse wave is doubled.

.....

**C- What's meant by ...?**

1- The frequency of a tuning fork is 652 Hz.

.....

.....

2- The oscillating body makes 540 oscillations in one and a half minute.

.....

.....

هذا الاختبار يجب عنه الطالب بنفسه ثم تابع  
حصة البث المباشر التي سيعلم عنها للحصول



# Answers

## **(1) Write the scientific term:**

- |  |                         |
|--|-------------------------|
| 1- Periodic motion                               | 2- Oscillatory motion   |
| 3- Amplitude                                     | 4- Complete oscillation |
| 5- Periodic time                                 | 6- Frequency            |
| 7- Wave  | 8- Wave motion          |
| 9- Line of wave propagation                      | 10- Transverse wave     |
| 11- Crest  | 12- Trough              |
| 13- Longitudinal wave                            | 14- Compression         |
| 15- Rarefaction                                  |                         |
| 16- Wave length ( $\lambda$ ) of transverse wave |                         |
| 17- Wavelength of longitudinal wave              |                         |
| 18- Amplitude of wave                            |                         |
| 19- Wave velocity                                |                         |
| 20- Wave frequency                               |                         |
| 21- Simple harmonic motion                       |                         |

## **(2) Give reason for:**

- 1- Because the motion of oscillating body is repeated through equal intervals of time.
- 2- Because the water particles vibrate in a direction perpendicular to the direction of wave propagation.
- 3- Because the medium (air) particles vibrate along the direction of waves propagation.
- 4- Because sound wave need a medium to propagate and they don't propagate through vacuum while radio waves don't need medium to propagate.
- 5- Because the light of lightning is from electromagnetic waves, while the sound of thunder is mechanical waves, where the speed of electromagnetic waves is much greater than the speed of mechanical

6- Because the sound is mechanical waves which need a medium to propagate through while the light is electromagnetic waves which can propagate through vacuum.

### **(3) Compare between:**

1) Mechanical waves and electromagnetic waves.

Mechanical	Electromagnetic
1- They need medium to propagate.	2- They do not need medium to propagate.
2- They don't propagate through vacuum (free space)	2- They propagate through vacuum (free space)
3- They are transverse waves or longitudinal waves.	3- They are all transverse waves.
4- Their speed is relatively low. Examples: sound waves (longitudinal) – water waves (transverse)	4- Their speed is great the speed of light = $3 \times 10^8$ m/sec Examples: light waves – radio waves (used in radars)

Point of comparison	transverse	Longitudinal
1- Definition	It is a disturbance in which the particles of medium vibrate perpendicular to the direction of wave propagation.	It is a disturbance in which the particles of medium vibrate along the direction of wave propagation.
2- Composition	crests and troughs	compressions and rarefactions
3- Examples	water waves	Sound waves

3) Oscillatory and wave motion

Points of comparison	Oscillatory	Wave
1- Definition	- it is the motion that is produced by oscillating body at the two sides of its original position.	- It is the motion produced as a result of the vibration of the medium particles at a certain moment and in a definite direction.
2- Velocity	- is maximum when the oscillating body passes its rest position. - is minimum when it goes far from its rest position.	- the wave has a definite velocity along the direction of propagation.
3- Examples	- Pendulum motion - motion of spiral spring	- sound waves as mechanical longitudinal wave. - light waves as electro-magnetic transverse waves.

#### 4- Problems

a) Amplitude (x) = 2 m

b) periodic time (t) = 2 seconds → time of oscillation  
= time / no. complete oscillation  
= 5/2.5 = 2 seconds

c) frequency (f) = 1/periodic time = 1/2 Hz

2- time = 2 × 60 = 120 seconds

Periodic time = time / no. complete oscillation = 120 / 500 = 0.24 sec

Frequency (f) = 1/periodic time = 4.1 Hz

3- Wave length = velocity / frequency =  $\frac{3 \times 10^8}{5 \times 10^8}$

= 0.6 m



4- 3 waves are formed between the first and fourth rarefactions

$$\therefore 4 - 1 = 3$$

$$\therefore \text{Wave length } (\lambda) = \frac{24}{3} = 8 \text{ m}$$

$$\begin{aligned}\therefore \text{Wave velocity } (v) &= \text{wave length } (\lambda) \times \text{wave frequency} \\ &= 8 \times 20 = 160 \text{ m/sec}\end{aligned}$$

$$\begin{aligned}4- \text{Wave length} &= \text{velocity} / \text{frequency} \\ &= 1500 / 100 = 15 \text{ m}\end{aligned}$$

$$\begin{aligned}5- \text{Wave velocity } (v) &= \text{wave length } (\lambda) \times \text{wave frequency} \\ &= 0.1 \times 25 = 2.5 \text{ m/s}\end{aligned}$$

$$\begin{aligned}6- T &= 0.02 \times 2 = 0.04 \text{ Sec} \\ F &= 1/T = 1 / 0.04 = 25 \text{ Hz}\end{aligned}$$

### **(5) What's meant by:**

- 1- The periodic time of spring is  $= 60/60 = 1 \text{ sec}$ .
- 2- Number of complete oscillation made by pendulum in one sec is 50 complete oscillations.
- 3- Distance between centers two successive compressions or centers of 2 successive rarefactions is 30 cm.
- 4- Maximum displacement achieved by medium particles away from their rest positions is 5 cm.

**1 - Write the definition of each of the following :**

- 1 - Periodic motion :.....  
.....
- 2 - Oscillatory (vibrational) motion :.....  
.....

**2 - Write the scientific term for each of the following :**

- 1 - The motion which is regularly repeated in equal periods of time
- 2 - It is the motion of the oscillating body around its rest point, where the motion is repeated through equal intervals of time
- 3 - The periodic motion made by a body around its point of rest, where the motion is repeated through equal intervals of time

**3 - Complete the following statements :**

- 1 - .....motion is the motion which is regularly.....in equal periods of time
- 2 - There are two types of periodic motion which are.....and.....
- 3 - The movement of.....,.....and.....are examples of oscillatory motion
- 4 - The movement of swing is an example of.....motion, because it repeats its movement in.....periods
- 5 - Motion of rotary bee is not considered as a.....motion, although it is a.....motion
- 6 - Kinetic energy = .....and its measuring unit is.....
- 7 - The velocity of the oscillating body reaches its maximum value when it passes its....., while it becomes zero when it reaches its.....
- 8 - The kinetic energy of the oscillating body reaches its.....value when it passes its original position, while it becomes.....when it reaches the maximum displacement
- 9 - The oscillatory motion is the motion of the oscillating body around its.....point and its velocity is.....when it passes this point of rest
- 10 - The simple harmonic motion is an example of.....

#### 4 - Give reason for each of the following :

- 1 - The **oscillatory** motion (or **wave** motion) is considered as a **periodic** motion?.....  
.....
- 2 - The motion of **spring** (**tuning fork**) is considered as an **oscillatory** motion?.....  
.....
- 3 - The **motion** of **rotary bee** is a **periodic** motion, but it is **not** an oscillatory motion?.....  
.....
- 4 - The **velocity** of the **simple pendulum** reaches to a **maximum** value?.....  
.....
- 5 - The **velocity** (speed) of the **body** is taken as **measure** of its **kinetic** energy?.....  
.....

#### 5 - What happens when :

- 1 - **Increasing** the **speed** of the pendulum? (Concerning its **kinetic energy**).....  
.....
- 2 - The oscillating body **passes** its **rest position** (original position) during its movement? (Concerning its **velocity** and **kinetic** energy).....  
.....
- 3 - The oscillating body **reaches** the **position** of its **maximum displacement** during its movement? (Concerning its **velocity** and **kinetic** energy).....  
.....

#### 6 - Choose the correct answer :

- 1 - The movement of **swing** is known as.....  
a. transitional motion                      b. oscillatory motion                      c. wave motion                      d. (a) and (b)
- 2 - **All** the following are examples of **oscillatory** motion, **except**.....  
a. motion of string                      b. motion of tuning fork                      c. motion of car                      d. motion of simple pendulum

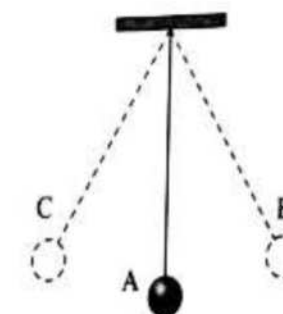


3 – The **oscillating body** moves at the **two sides** of its **rest position**, so its **velocity**.....

- a. decreases when it goes far from its rest position
- b. increases when it goes far from its rest position
- c. will reach its maximum value when it passes its rest position
- d. (a) and (c) together

4 – From the opposite figure :

- a. The maximum **velocity** of the pendulum is at point(s).....  
(A – B – C – C,A)
- b. The maximum **kinetic energy** of the pendulum is at point(s).....  
(A – B – C – C,B)
- c. The **kinetic energy** of the pendulum **vanishes (equals zero)** at point(s).....  
(A – B – C – B,C)



5 – **Kinetic energy** =  $\frac{1}{2} \times$  .....

- a.  $m/v^2$
- b.  $mv^2$
- c.  $m^2v^2$
- d.  $mv^3$

**7 – Cross the odd word out, then write scientific term :**

**1** – Pendulum motion – spring motion – rotary bee motion – stretched string motion (.....)  
.....

**8 - Put (✓) or (x), then correct the false statement :**

- 1** – The **oscillatory motion** is regularly repeated in equal intervals of **time** (.....)
- 2** – The **motion** of **tuning fork** is a **wave motion** (.....)
- 3** – The **swing** is an example of **periodic motion** (.....)
- 4** – The **tuning fork oscillation** is an example for the **periodic motion** (.....)
- 5** – The motion of **rotary bee** is an oscillatory motion (.....)
- 6** – The velocity of the oscillating body reaches its maximum value when it passes its original positon (.....)
- 7** – The kinetic energy of the simple pendulum decreases by increasing its velocity (.....)



8 – The **simple harmonic motion** is a form of **oscillatory motion** (.....)

### 9 – When do the following cases happen?

1 – The **motion** of a body is a **periodic** motion?.....

2 – The **periodic motion** is an **oscillatory** motion?.....

3 – The **velocity** of a pendulum reaches its **maximum** value?.....

4 – The **kinetic energy** of a pendulum reaches its **minimum** value?.....

Second: **Amplitude - complete oscillation**

### 1 - Write the definition of each of the following :

1 – Amplitude :.....  
.....and its **measuring unit** is.....

2 – Complete oscillation (vibration) :.....

### 2 – What is meant by :

1 – The **amplitude** of an oscillating body is 10 **cm**?.....

### 3 - Write the scientific term for each of the following :

1 - It is the **maximum displacement** done by the oscillating body **away** from its **rest (original)** position

**2** - It is the **motion** of an **oscillating body** when it **passes** by a **fixed point** on its path **two successive times** in the **same direction**

**4** – **Mention the unit(s) used for measuring each of :**

1 – Amplitude (.....)

**5** – **Mention the mathematical relation (formula) (law) for :**

1 – Amplitude and complete oscillations of an oscillating body

**6** – **Complete the following statements :**

**1** – The **amplitude** is.....and its **measuring unit** is.....

**2** – The complete oscillation **comprises**.....successive **displacements**, each one is called.....

**3** – One complete oscillation = .....amplitudes

**4** – Amplitude =.....complete oscillation

**7** – **Choose the correct answer :**

**1**- The **maximum displacement** done by the **oscillating body** away from its **original (rest) position** is.....

a. amplitude

b. frequency

c. periodic time

d. complete oscillation

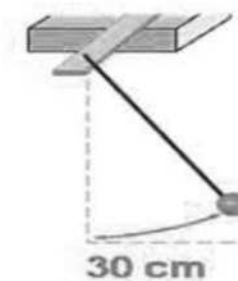
**2** – The following figures **describe** the **oscillation** of a **simple pendulum** at **different intervals** of **time**. The **amplitude** of such **pendulum** =.....

a. 30 cm

c. 20 cm

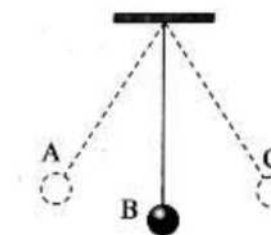
b. 25 cm

d. 10 cm

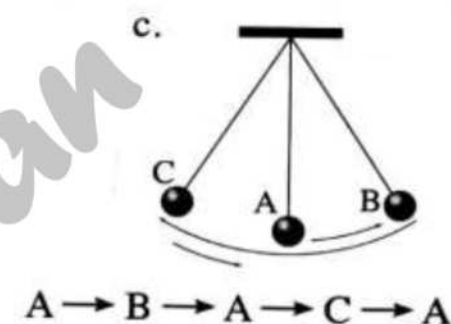
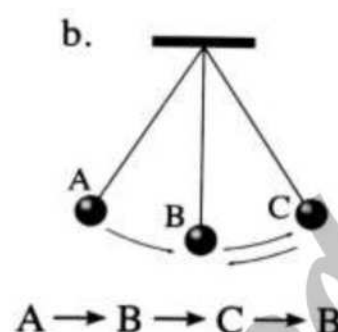
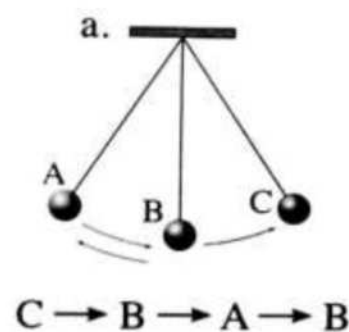


3 – Which of the following represents **a complete oscillation** for a simple pendulum?.....

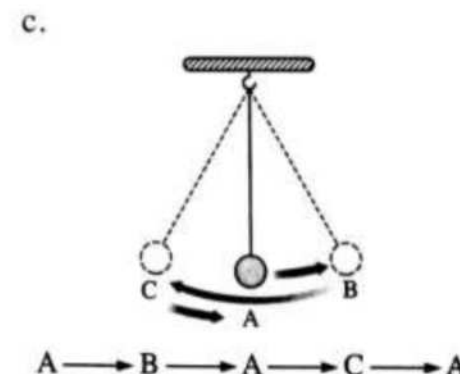
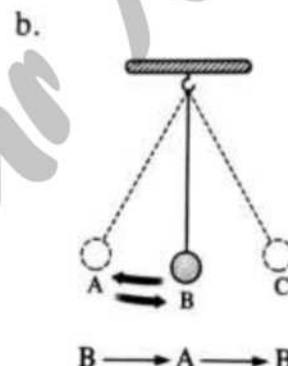
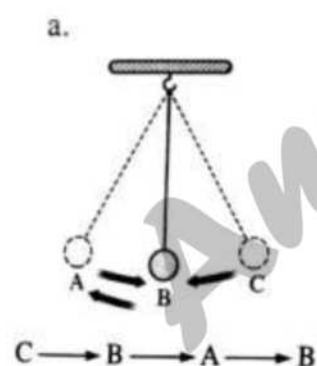
- a.  $C \rightarrow B \rightarrow A \rightarrow B$
- b.  $A \rightarrow B \rightarrow C \rightarrow B \rightarrow A$
- c.  $A \rightarrow B \rightarrow C$
- d.  $B \rightarrow C \rightarrow B \rightarrow A$



4 – Which of the following figures represents **a complete oscillation (vibration)**?.....



5 – Which of the following represents **a half complete oscillation (vibration)**?.....



6 – The **complete oscillation** includes.....**displacements (amplitudes)**

- a. one
- b. 2 successive
- c. 3 successive
- d. 4 successive

7 – The **amplitude** of the **simple pendulum** is.....of a **complete oscillation**

- a. four times
- b. quarter
- c. half
- d. double



## 8 - Put (✓) or (x), then correct the false statement :

1 - The **amplitude** is measured in metre (.....)

2 - The **complete oscillation** consists of two successive displacements (.....)

## 9 - Problems :

1 - If the **maximum displacement** done by the **oscillating body** away from its **original position** is 0.5 cm.

Find the **total distance** covered to makes 5 complete oscillations

.....

.....

.....

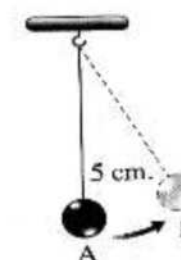
.....

2- In the opposite figure, calculate the **total distance** covered by the **pendulum** to make 3 complete oscillations

.....

.....

.....



2 - Calculate the **amplitude** of a pendulum which covers a **distance** of 80 cm. to make one **complete oscillation**

.....

.....

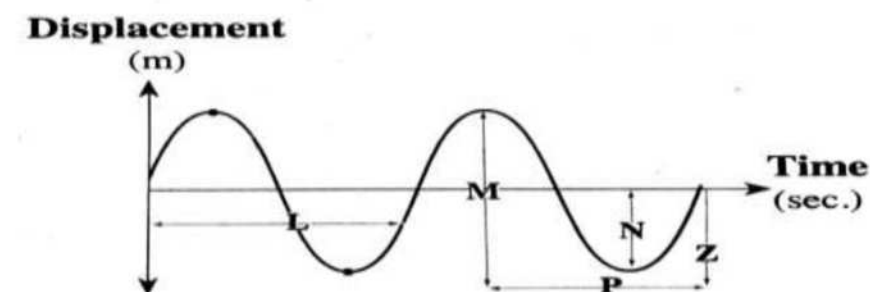
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## 10 - Study the following figures, then answer :

1 - The opposite figure represents an oscillatory motion for a simple pendulum. Choose the letter that denotes :

- The **amplitude** (.....)
- The **oscillation** of the **pendulum** forming  $\frac{3}{4}$  complete oscillation (.....)





### Third: Periodic Time (T) - Frequency (F)

#### 1 - Write the definition of each of the following :

- 1 - Periodic time (T) : .....  
.....and its measuring unit is.....
- 2 - Frequency (F) : .....  
.....and its measuring unit is.....

#### 2 - What is meant by :

- 1 - The periodic time of a tuning fork is 0.5 sec?.....  
.....
- 2 - The frequency of a simple pendulum is 60 Hz?.....  
.....

#### 3 - Write the scientific term for each of the following :

- 1 - It is the time taken by an oscillating body to make one complete oscillation
- 2 - The time of one complete oscillation
- 3 - The measuring unit of the periodic time
- 4 - The number of complete oscillations done by an oscillating body in one second
- 5 - The measuring unit of the frequency

#### 4 - Mention the unit(s) used for measuring each of :

- 1 - Periodic time (T) (.....)
- 2 - Frequency (F) (.....)

#### 5 - Mention the mathematical relation (formula) (law) for :

- 1 - Periodic time and number of complete oscillations made by an oscillating body in a certain time  
.....
- 2 - Periodic time and time of amplitude  
.....

3 – Frequency and number of complete oscillations made by an oscillating body in a certain time

.....

## 6 – Complete the following statements :

1 – The periodic time is the time of.....and its measuring unit is.....

2 – Periodic time (T) =  $\frac{\text{.....}}{\text{.....}}$

3 – The periodic time is.....proportional to the number of complete oscillations

4 – By increasing the number of complete oscillations that are made by a simple pendulum, the periodic time.....

5 – The periodic time =.....x the time of amplitude

6 – The time of amplitude = .....the periodic time

7 – The frequency is the.....in one second and its measuring unit is.....

8 – From the memorial of the scientist Hertz, the measuring unit of frequency is.....which is symbolized by.....

9 – Frequency (F) =  $\frac{\text{.....}}{\text{.....}}$

10 – The frequency is.....proportional to the number of complete oscillations

11 – By increasing the number of complete oscillations made by a simple pendulum, the frequency.....

## 7 - Give reason for each of the following :

1 – The periodic time decreases as the number of complete oscillations increases?.....

.....

2 – The frequency increases as the number of complete oscillations increases?.....

.....

## 8 – What happens when :

1 – Number of oscillations produced by a vibrating pendulum increases? (Periodic time).....

.....





- 4 – The **frequency** is the **number** of **complete oscillations** made by the **oscillating body** in **one minute** (.....)
- 5 – The **frequency** of an oscillating body is measured in **seconds** (.....)
- 6 – The **product** of **dividing** the **number** of **complete oscillation** made by an oscillation object **over** the **time taken** to makes these **oscillations** equals its **periodic time** (.....)

## II – Problems :

### I – Periodic time (T) :

- 1 – Calculate the **periodic time** of a source that makes 600 **oscillations** in 1 **minute**

.....

.....

.....

- 2 – If the **periodic time** of an oscillating body is 0.2 **seconds**. Find the **time taken** to do 5 **complete oscillations**

.....

.....

.....

- 3 – If the **periodic time** of an oscillating body is 0.1 **second**. Calculate the **number** of **complete oscillations** in one **minute**

.....

.....

.....

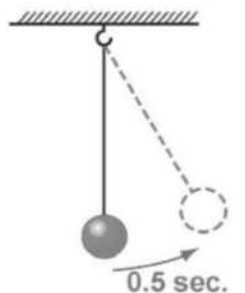
- 4- From the opposite figure, calculate the **periodic time** for the **pendulum**

.....

.....

### - Complete :

- 1 – An oscillating body makes 900 **oscillations** in half **minute**, its **periodic time** is.....





- 2 – If the **periodic time** of an oscillating body is 0.2 seconds, so the *time taken* to do 9 complete oscillations is.....
- 3 – If the **periodic time** of an oscillating body is 0.1 second, so the **number** of complete oscillations in one minute is.....
- 4 – If the **maximum displacement** done by the oscillating body away from its rest position is 0.2 cm which is made in 0.5 second, so its *amplitude* is.....and the *periodic time* is.....

**- Choose :**

- 1 – An oscillating body makes 20 oscillations in second, so its **periodic time** = ...sec
- a. 0.05                                      b. 0.2                                      c. 0.1                                      d. 5
- 2 – The **periodic time** of an oscillating body which makes 240 oscillations in one minute equals.....
- a. 1 sec                                      b.  $\frac{1}{4}$  sec                                      c.  $\frac{1}{2}$  sec                                      d. 4 sec
- 3 – If the **periodic time** of an oscillating body is 0.1 sec. so the **number** of complete oscillations in one minute is.....
- a. 10                                      b. 120                                      c. 60                                      d. 600

**2 – Time of amplitude :**

- 1 – Find the *time* of *making amplitude* of a simple pendulum makes 600 complete oscillations in one minute

.....

.....

.....

**3 – Frequency (F) :**

- 1 – Find the *frequency* in *GHz* of a simple pendulum which makes 720 complete oscillations in 90 seconds

.....

.....

- 2 – Calculate the *number* of *complete oscillations* made by a body in 2 minutes, if its frequency is 6 Hz

.....

.....

**- Complete :**

1 – An oscillating body makes 600 **complete cycles** per **minute**, its **frequency** is.....

2 – If the **frequency** of an oscillating body equals 6 **Hz**, so the **number of complete oscillations** in two **minutes** is.....

**- Choose :**

1 – A **pendulum** makes 540 **complete oscillations** in a **minute**, so its **frequency** is.....

a. 3 Hz

b. 6 Hz

c. 9 Hz

d. 12 Hz

Foruth: **Accumulative**

**1 – What is meant by :**

1 – The **time taken** by a **spring** to make 60 **complete oscillations** is 1 **minute**?.....

2 – The **number of complete oscillations** made by an **oscillating body** in 10 **seconds** is 500 **complete oscillations**?.....

**2 - Write the scientific term for each of the following :**

1 – The *reciprocal* of frequency

2 – The *reciprocal* of periodic time

**3 – Mention the mathematical relation (formula) (law) for :**

1 – Frequency and periodic time

**4 – Complete the following statements :**

1 – The result of **multiplying** the **frequency** of a spring by its **periodic time** equals.....



2 – (Frequency x Periodic time) – 1 = .....

3 – Frequency (F) =  $\frac{\text{.....}}{\text{Periodic time (T)}}$

4 – Periodic time (T) =  $\frac{\text{.....}}{\text{Frequency (F)}}$

5 – The **periodic time** is the.....of the **frequency**

6 – The **frequency** is the.....of the **periodic time**

7 – The **frequency** is.....**proportional** to the **periodic time**

8 – When the **frequency** of the moving pendulum **increases**, its **periodic time**.....

### 5 - Give reason for each of the following :

1 – The **product** of **frequency** and **periodic time** equals **unity**?.....  
.....

2 – **Frequency** of the vibrating body **decreases** by **increasing** the **periodic time**?.....  
.....

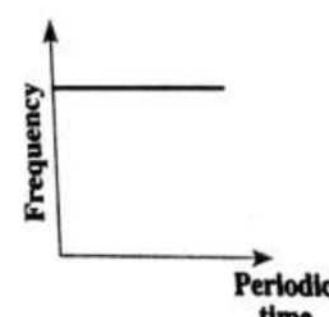
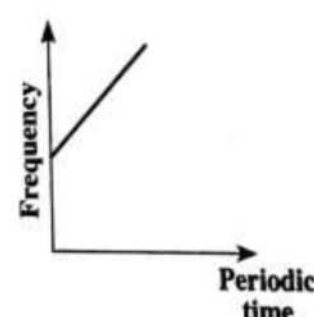
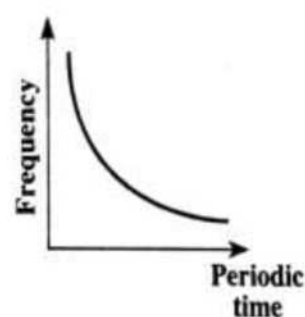
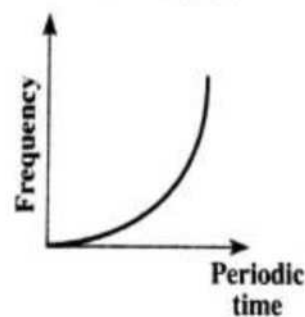
### 6 – What happens when :

1 – **Number of oscillations** produced by a vibrating body **increases**?(**Periodic time** and **frequency**).....  
.....

2 – The **number of complete oscillations** is **equal to the time taken** by the vibrating body to **make these oscillations**?.....  
.....

### 7 – Choose the correct answer :

1 – Which of the following figures represents the **relation** between **frequency** and **periodic time**?.....



**3** – The result of **multiplying** the **frequency** of an oscillating body by its **periodic** time.

- a.  $\frac{1}{2}$                       b.  $\frac{1}{4}$                       c.  $\frac{1}{3}$                       d. 1

4 – If the **frequency** of an **oscillating** body is 5 Hz. So the product of *multiplying* its **frequency** by its **periodic time** equals.....

- a. 1                      b. 5                      c. 10                      d. 25

**5** – If the frequency of an oscillating body is 6 Hz, so its periodic time is.....

- a. 3 sec                      b. 6 sec                      c.  $\frac{1}{3}$  sec                      d.  $\frac{1}{6}$  sec

**8 - Put (✓) or (x), then correct the false statement :**

**1** – The frequency of the oscillating body is the reciprocal of the periodic time (.....)

2 – Frequency is directly proportional to the periodic time (.....)

3 – The **frequency** is equal to the **periodic time**, when the **number of complete oscillations** equals the **time** take to make these oscillations (.....)

## 9 – When do the following cases happen?

1 – The **value** of the **periodic time** of a vibrating body *equals* its **frequency**?.....

## 10 – Problems :

1 – If the frequency of an oscillating body is 10 Hz. Find

- Its **periodic time**
- The **time taken** to makes 300 **complete oscillations**
- The **number of complete oscillations** made in a **minute**

.....

.....

.....

.....



## II – Study the following figures, then answer :

1 – From the opposite figure, complete :

- Point (A) represents.....
- The **distance** (AB) represents.....
- The **motion** of simple pendulum (A → B → C → A) represents.....and the **time** of this **motion** is called.....

2 – From the opposite figure, complete the following :

- The oscillating body has a **maximum kinetic energy** at point(s)
- The **velocity** of the **pendulum** is **minimum** at point(s).....
- If the **pendulum** takes 0.2 **second** to move from (A) to (B), so its **periodic time** is.....

3 – Study the opposite figure, then answer the following questions :

- Point (A) represents.....
  - The **distance** (AB) represents.....and it **equals** the **distance**.....
  - The vibrating body has its **maximum** kinetic energy at point(s)...
  - When the **pendulum** makes 600 **complete oscillations** in two **minutes**, its **frequency** =.....and its **periodic time**=.....
- .....
- .....

4 – The opposite figure represents **three simple harmonic motions** (A, B and C) : Which one has :

- The largest **frequency** :.....
- The largest **amplitude** :.....

5 – The following figures represent the **motion** of two oscillating bodies :

- What are the **similarities** between them?

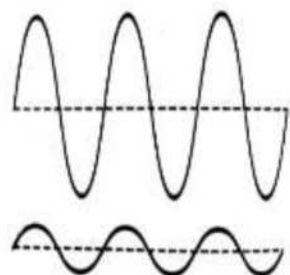
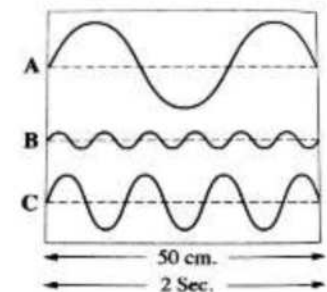
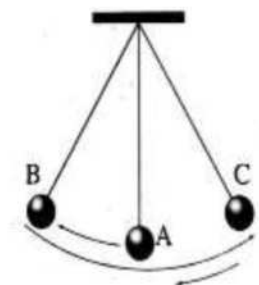
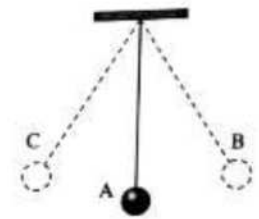
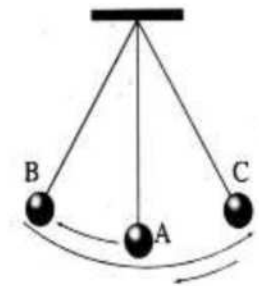
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- What are the **differences** between them?

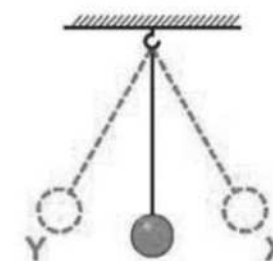
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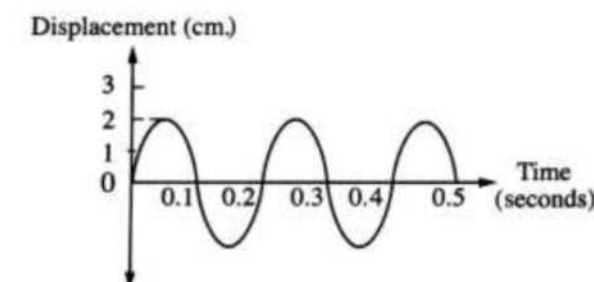
6 – In the opposite figure, when the ball of pendulum moves from (X) to (Y) in a duration of 0.02 sec, the **periodic time** equals.....sec and the **frequency** time.....Hz (choose 2 answers)

- a. 0.04  
b. 0.02  
c. 25  
d. 50



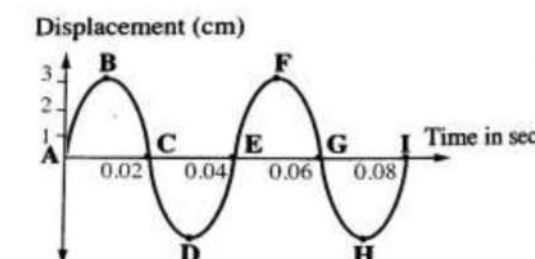
7 – From the opposite figure, calculate :

- a. **Amplitude** :.....  
b. **Number of complete oscillations** :.....  
c. **Periodic time** :.....  
d. **Frequency** :.....



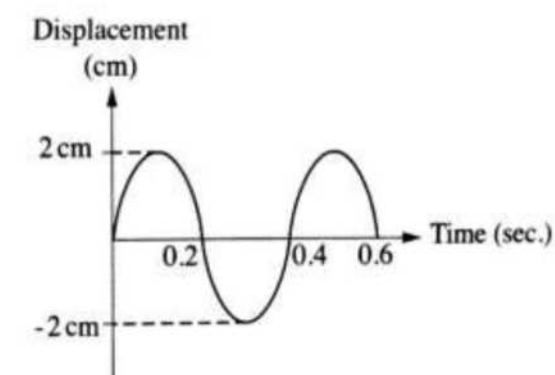
8 – The opposite figure represents an oscillatory motion. Find

- a. **Amplitude** :.....  
b. **Number of complete oscillations** :.....  
c. **Periodic time** :.....  
d. **Frequency** :.....



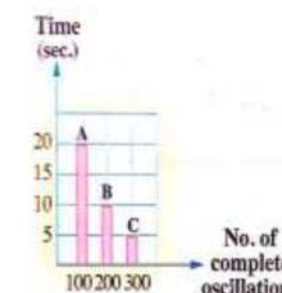
9 – From the opposite figure, choose the correct answer :

- a. The **periodic time** =.....  
[0.2 sec – 0.4 sec – 0.6 sec – 0.4 m ]  
b. **Frequency** = .....  
[0.2 sec – 0.4 Hz – 2 cm – 0.4 cm]  
c. The **amplitude** =.....  
[0.2 sec – 0.4 sec – 2 cm – 0.4 cm]



10 – The opposite figure indicates the oscillatory motion of three bodies (A), (B) and (C)

- a. Which of these bodies have a **very high frequency**?  
.....  
b. What is the **value** of the **periodic time** of the body (B)?  
.....  
.....



11 – From the opposite graph, answer the following questions :

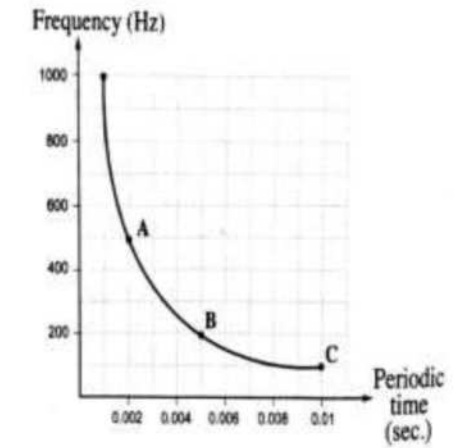
a. Determine the **number of complete oscillations** which made by (A), (B) and (C) in **one second**

.....

b. Determine the **periodic time** of the oscillating body (B)

.....

c. What is the **type of relation** between the frequency and the periodic time?.....



Amr Madian

THANK YOU